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See Page 99

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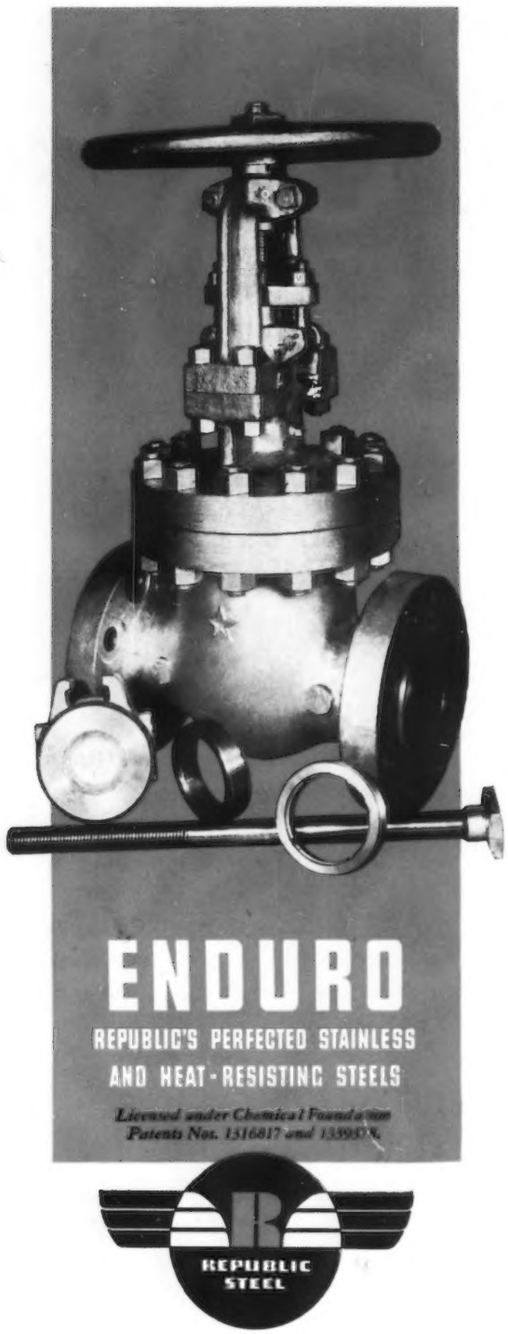

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TESTING SILCROME --a Science in itself

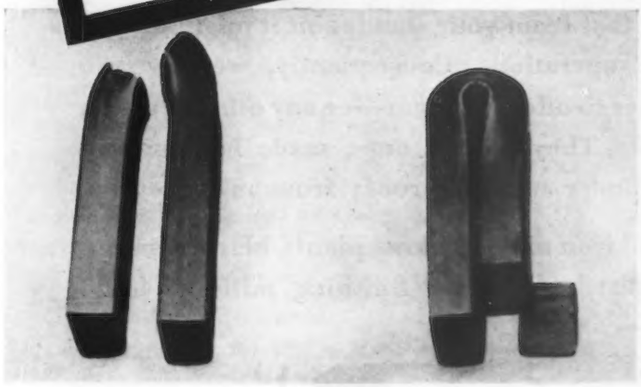


FIGURE 1

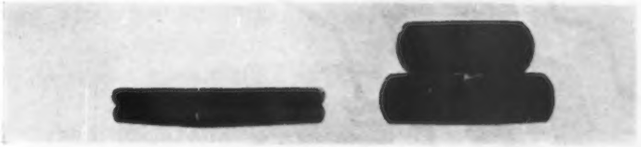


FIGURE 2

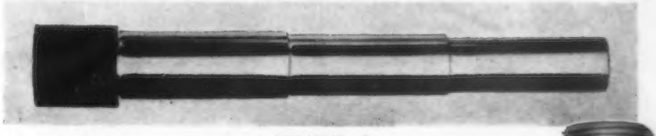
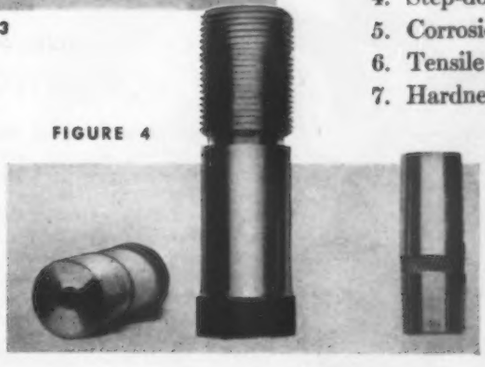


FIGURE 3

The illustrations on this page show but a few of the standard Ludlum tests. Careful buyers will, we believe, be interested in learning all the facts on Quality Control in the production of Ludlum Silcrome. These facts are accurately presented in a new illustrated folder which will be sent free on request. Just mail the coupon.

FIGURE 4



As industry turns to Silcrome and other stainless steel alloys, buyers have become increasingly aware that quality control in the production of the steel itself vitally affects their own costs. That the steel be of specified analysis is not enough. Production costs are affected by factors of machinability, hardness, cleanliness and uniformity. Service costs, customer satisfaction and good will depend upon corrosion resistance, resistance to impact, tension, bending, heat, wear and the like.

Ludlum's response to the needs of the day has been not one or two tests, but a dozen—and more. Testing Silcrome is today a science—a science that has resulted in Quality Control which sets new standards. Grouped as compactly as possible, the following types of testing operations are in daily use at the Ludlum mills:—

1. Microscopic inspection of etched discs.
2. Microscopic examination of polished sections.
3. Surface inspection of ground and polished bar sections.
4. Step-down tests (*see fig. 3*).
5. Corrosion tests.
6. Tensile tests.
7. Hardness tests.
8. Impact tests.
9. Bend tests (*see fig. 1*).
10. The securing of data on critical points and linear expansion.
11. Magnetic tests.
12. Upsetting tests (*see fig. 2*).
13. Machinability tests (*see fig. 4*).

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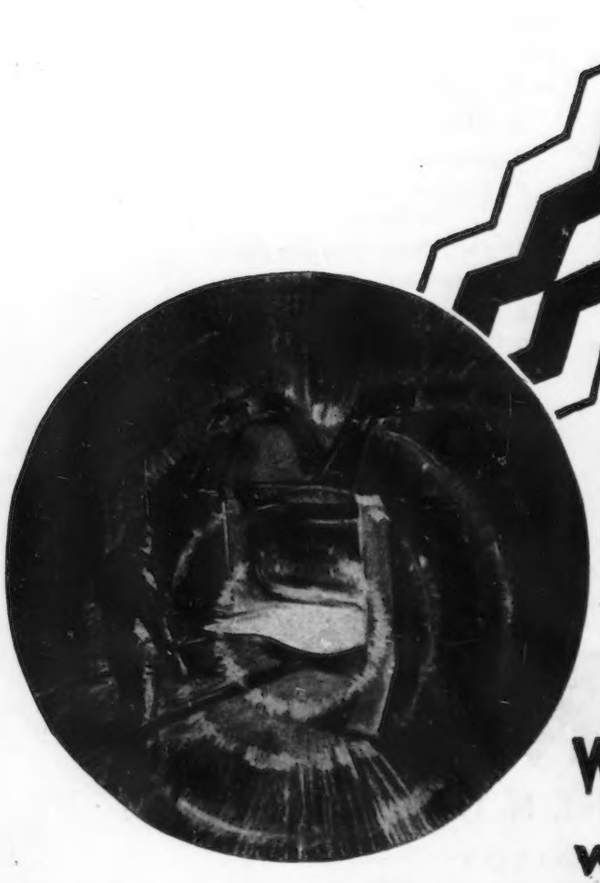

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110 Years

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Five months before Mr. Prentiss joined us, Mr. R. D. Boltey attached himself to the then small staff of factory workers. He was a hard worker. Within a few years he was foreman of a department. Then he went through almost every department of our factory. In 1905, or thereabouts, he joined the sales staff. For thirty years, Mr. Boltey has been selling our products. He knows more about them, and how to use them profitably, than any man alive.

"Cleveland" Twist Drills and Reamers are all the better because these two men have served them, and their users, so faithfully for so long . . . . .

MR. F. F. PRENTISS
Chairman, Board of Directors
July 1, 1935

About the time Mr. Prentiss became connected with this Company

MR. R. D. BOLTEY
Senior Cleveland Salesman
March 17, 1935

Mr. Boltey, a few years after he joined us

The CLEVELAND TWIST DRILL COMPANY
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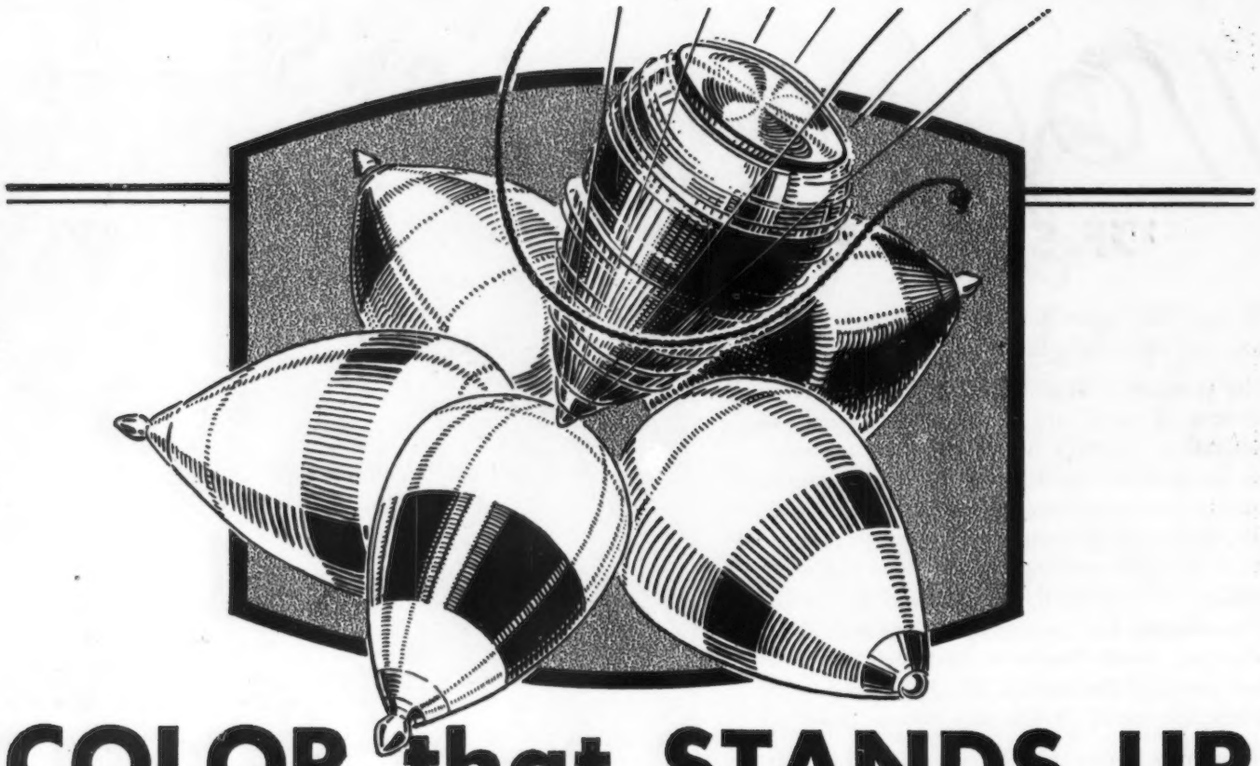

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Wood Products
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Toys and many others

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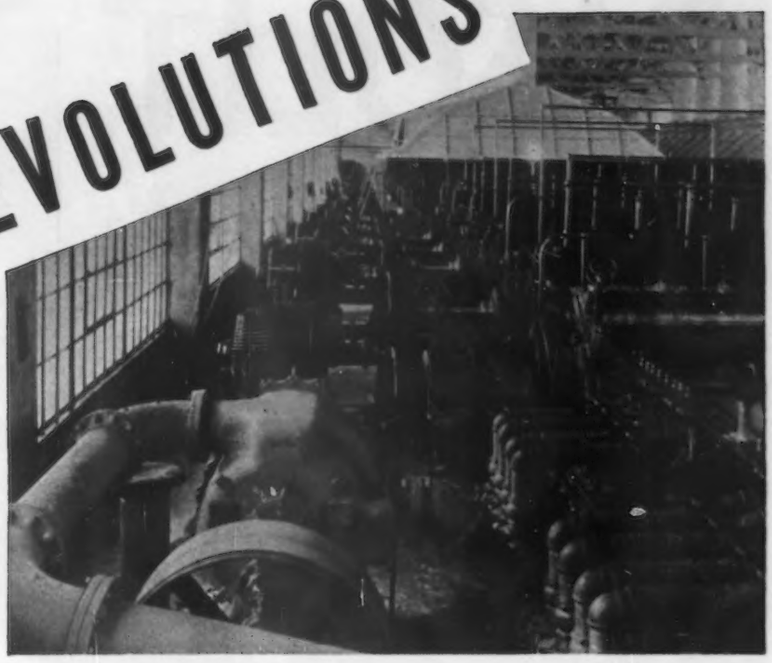

Since 1923, these nine Westinghouse speed reducers have operated almost continuously and are still giving trouble-free service.

-TOOL MARKS WERE STILL VISIBLE

● 24 hours a day, 6 days a week, for almost 12 years, the 9 Westinghouse speed reducers of the Washington Pulp and Paper Company have operated continuously.

Gear tooth wear after 3 years' service was only .0038 inch while pinion wear was only .0152 inch. And, when last inspected in 1933 tool marks were still faintly visible on the Coutch gear, although it had made more than three billion revolutions since its installation in April, 1923.

What better proof can there be of the long-life and freedom from trouble of Westinghouse speed reducers. Equipped with single helical gears—BPT Heat Treated—the most efficient type known—and Timken bearings, they deliver power smoothly . . . quietly . . . and with minimum loss.

R 65007

Type SH single reduction speed reducer.

Westinghouse *Speed Reducers*

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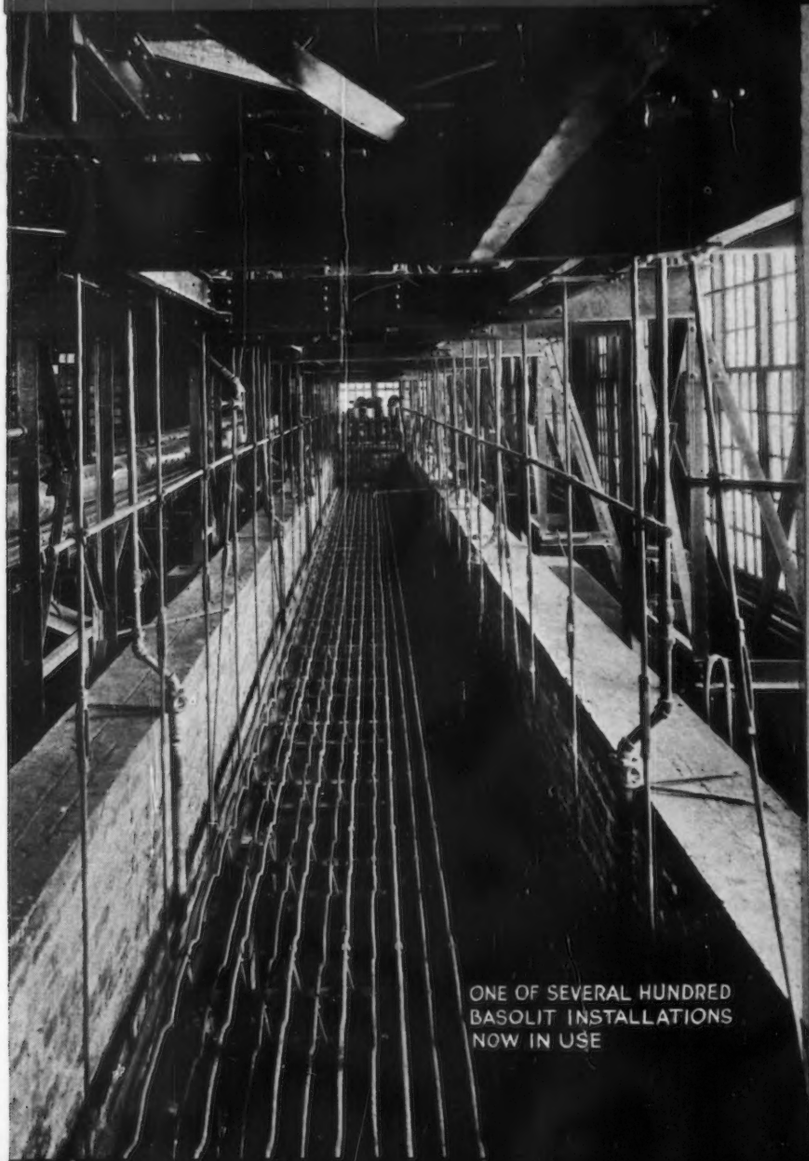
BASOLIT

Pickling Tanks for Durability



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A GLANCE at this pickling tank and its associated handling equipment indicates that tank failure would seriously delay production.

It won't fail, however, because the Pressed Steel Tank Co. of Milwaukee took the precaution to install a Basolit Tank which is wear-proof and leak-proof against all commercial acids. Generally sulphuric acid is used. However, metallurgical advance demands frequent use of nitric, hydrochloric acids, etc. Basolit Tanks are safe whatever your future requirements may be.

This 110 ft. Basolit Pickling Tank is used for pickling 200 to 400 tons weekly of seamless steel shells prior to cold drawing operations. It has been in continuous service for over 4 years, and has well satisfied its user with negligible maintenance cost.

Play safe by specifying "Basolit" for pickling tanks.

This tank installed Nov., 1930

NUKEM PRODUCTS CORP., Buffalo, N.Y.

NEW YORK PITTSBURGH LOS ANGELES TORONTO, ONT.

THE IRON AGE

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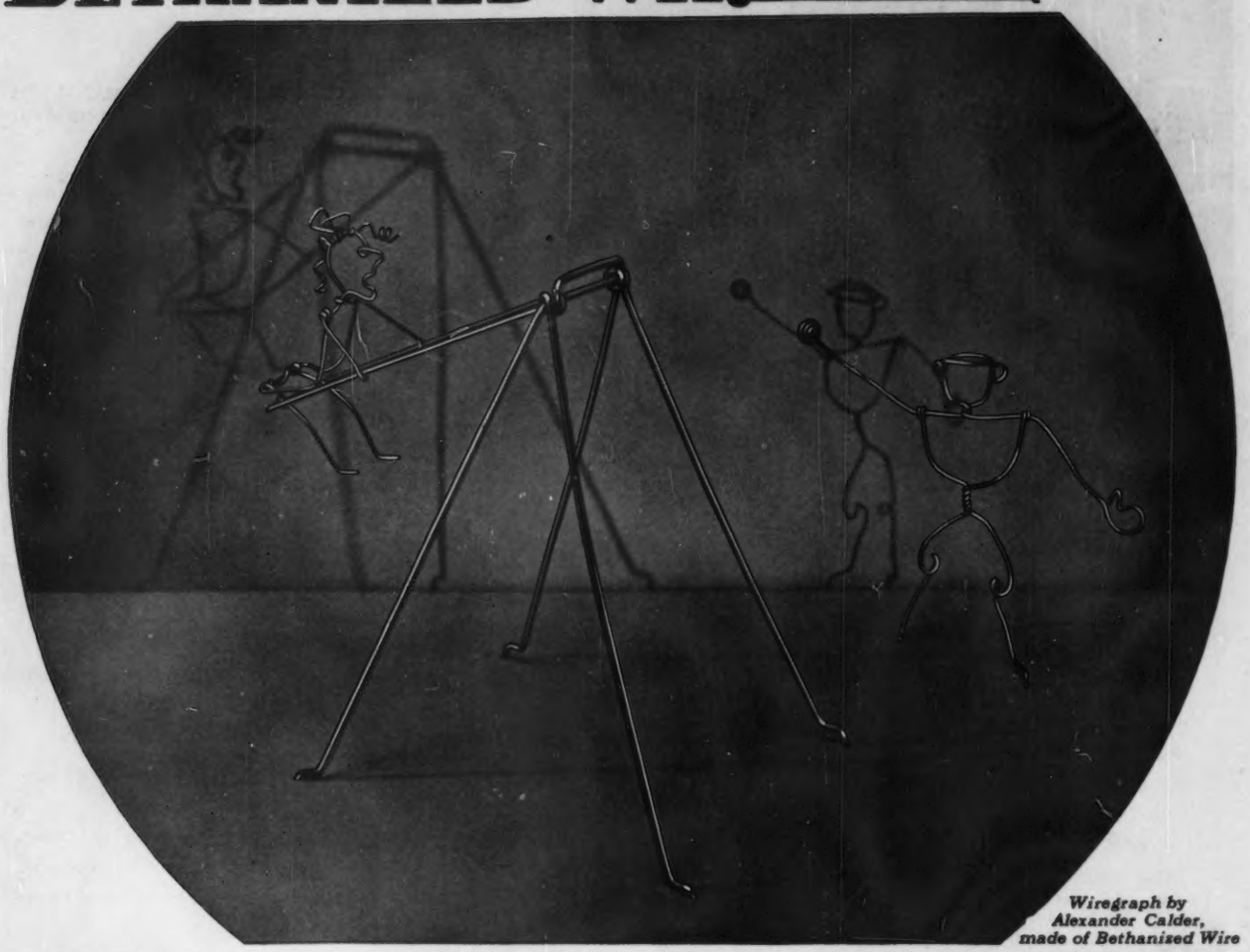
BETHANIZED WIRE



Wiregraph by Alexander Calder, made of Bethanized Wire

Well-fenced parks and playgrounds

THE silvery lustre of the zinc coating on Bethanized Wire, lending added attractiveness to chain-link or other types of fences for playgrounds, parks and schools, is the result of an entirely new process of zinc coating.

The zinc is applied electrolytically and is purer, more uniform, more adherent to the base, and far more ductile than galvanizing applied by older processes. When desired, Bethanized coatings can be furnished exceptionally heavy—two, three or more times the weight of the conventional hot-dip coating.

The Bethanized coating withstands severe bending and twisting operations that would badly damage ordinary galvanizing. For example, with Bethanized Wire the practice of galvanizing chain-link fence after weaving can be avoided. Instead the fence is woven of wire that has already been zinc-coated. The heavy Bethanized coating stands the weaving without cracking or peeling, and the resulting fence has a more uniform and heavier deposit of zinc.

Chain-link fence is only one of many products that are being given improved appearance, longer life, higher salability through the use of Bethanized Wire. Whatever is being made of zinc-coated wire . . . fence, springs, brush handles, spokes for baby carriages or bicycle wheels . . . it's worth looking into the possibilities of Bethanized Wire.

BETHLEHEM STEEL COMPANY

GENERAL OFFICES: BETHLEHEM, PA.

▲▲▲ THE IRON AGE ▲▲▲

JULY 4, 1935

ESTABLISHED 1855 Vol. 136, No. 1

Soak the Rich and Smash the Big!

OF EVERY 100 individuals of "average" physical or mental abilities, about two are found to be oversize. How they got that way, whether by application and exercise or through the benefit of impersonal exigencies, does not affect the situation.

In these days of peculiar and imported political sophistry, it is urged that the oversized few be trimmed down to the stature of the averaged sized many.

That is the philosophy back of the unionization movement with its restriction on individual output; it is the philosophy back of the socialistic doctrine of wealth redistribution and it is the philosophy behind the communistic attack on bigness in business.

Will restrictions upon the oversized few benefit the average sized many?

There is a ditch to be dug and one hundred men are put at the task. Two of them are physical giants, capable of doing as much work as four average laborers. Will it benefit the other ninety-eight or the general public to slow the two big fellows down by hobbling their hands and feet so that they can work at but one-half of their capacity?

What benefit to the Tom Jones and John Smiths of America to arrange things so that there can never be another Henry Ford?

Suppose that there were to be confiscation of all corporation profits and that the fruits of this were to actually go to the general public instead of into the hands of politicians and bureaucrats. Would the $12 per year thus added to each individual's pocketbook compensate for the closing down of profitless American industry?

There *is* one business in this country that has grown too big and which calls for drastic curtailment before it eats up all other businesses. That business is the Federal Government as now mismanaged and malconducted. It is a poor doctor who despises his own medicine.

"I accuse the present administration of being the greatest spending administration in peace times in all our history —one which has piled bureau on bureau, commission on commission, and has failed to anticipate the dire needs of reduced earning power of the people."—Franklin D. Roosevelt's Speech at Sioux City, Iowa, September 29, 1932.

Expenditures of United States Government from President Washington to President Taft, 124 years, from 1789 to 1913 inc.—$24,521,845,000.

Expenditures of present Administration, actual 1934 and President's estimate for 1935 and 1936. A three year period—$24,206,533,000.

J. H. VanDeventer

Analysis of Design And Construction Of Hot Blast Stoves

By ALBERT MOHR, JR. and FRED WILLE
John Mohr & Sons, Chicago

FOR several decades the question of hot blast stove efficiency has been growing in importance, first on account of the development of blast furnaces having a greater producing capacity per individual unit, and, secondly, on account of a more thorough knowledge of the economics of the fuel balances (both solid and gaseous) which are obtained in the individual operations.

Various designs advanced to meet the demands for this increase in efficiency have been more or less of a hit-or-miss variety. Not enough consideration has been given to the theoretical fundamentals which govern the interrelation of structural stability, available heating surface and rates of heat transfer. The result has been that tiles and fillers have been introduced which are not only too complicated in design, but also very difficult and expensive to manufacture. In some cases this complication and difficulty of manufacture has necessitated extra charges as high as 175 per cent of the normal base price for standard stove shapes. These extra expenditures could be justified if they were necessary; however, a review of the fundamentals of stove design and efficiency, such as structural stability and laws governing heat transfer, will show specifically that, in most cases, expenditures have been incurred needlessly and in many cases without obtaining the objective sought, i.e., increased efficiency at a minimum cost.

In the design of a hot blast stove the consideration of paramount importance is structural stability. This stability depends on (1) thickness of brick, (2) size and shape of brick, (3) arrangement of brick and fillers to form flues, and (4) fractional checker around walls.

In hot blast stove developments of today, the thickness of checker wall is invariably interrelated to the total heating surface desired. Past experience has developed that no compromise in favor of greater heating surface, which demands a checker wall less than 2 in. in thickness, can be entertained if the proper structural stability and the incident longer stove lining life is to be obtained. To circumvent this axiomatic fact, fillers and tiles of complicated design have been introduced. The fact still remains, however, that any brick thickness less than 2 in. in stove construction is more conducive to ultimate breakdown and stove failure than if the greater section was used. The manufacture of these complicated fillers and tiles introduce other variables into the picture—variables which are not in force when standard shapes, backed by years of development, are produced. It is obvious that a more uniform product can be expected when the manufacturer is working on a standard line than when specifications which are produced now and then are being manufactured.

The question of brick thickness as a function of heat conductivity will be discussed later, and the possibility of saving through the use of a brick thickness less than 2 in. will be shown to be so remote that it can be neglected, once the question of stability of construction has been established.

As an economical mean between the fundamental questions of structural stability (as far as brick thickness is concerned) and maximum heating surface obtainable, a brick shape not less than 2 in. in thickness is recommended for all checker wall construction.

Any discussion of the size and shape of brick used in hot blast stove construction must consider the following three fundamentals:

First: How do they lend themselves to the desired design?

Second: What problems do they introduce in the manufacturing, as reflected in the physical grade and cost of product delivered?

Third: What are the thermocritical considerations to be investigated?

The question of design is guided in most cases by a desired heating surface per stove and limited by a given diameter and height of stove. The idea of crowding as much brick volume into this shell as is compatible with the desired heating

surface, sacrificing in too many cases the structural rigidity and ultimate stove lining life, has often been the method followed. In many cases this has been perpetrated on account of erroneous ideas relative to the so-called turbulency of flow and heat transfer. It is the aim of this discussion to outline these fundamentals later in this text.

If the decision has been made that standard shapes do not lend themselves to the desired result, an investigation is made relative to the use of fillers and tiles; and the manufacturers' problems are then introduced in direct ratio to their complicacy of design. It is obvious at once that the manufacturing will be more difficult, the product less uniform in physical properties, and the initial cost greater.

The last phase, i.e., the investigation of thermo-critical considerations is seldom, if ever, thoroughly understood. Every brick manufacturer is familiar with the thermo-physical action of the clays used. He is not so familiar with the fact that there are obtained hot blast stove temperatures which bracket the thermo-critical points inherent in the clays used. For this reason whenever a new or complicated shape is introduced for manufacture, one that must stand years of subjection to varying ranges of temperature, a new problem is introduced which will take a long time to solve. It is quite obvious, taking into consideration the effect of size and shape during burning, that checker brick of standard shape are the safest in the long run if the maximum rigidity of construction is to be maintained in hot blast stoves for a long period of time.

Avoid Fractional Checkers

In laying the checker brick—tile and other complicated shapes are not recommended—each vertical and horizontal joint should be broken. This procedure distributes the total load over a greater area and superimposes it always at an angle of 90 deg., and, also, it minimizes the possibilities of checker distortion. A simple filler is recommended. This filler should extend across the checker area in such a way as to furnish additional insurance against distortion, and it should be interlocked in staggered relation, one upon the other, so as to overlap every horizontal joint of checker brick and to cause a change of flow in every checker depth. The dimensions of the filler should be the same as the checker walls in order to guard against distortion through unequal expansion.

No fractional checker openings are used because it has been known to be bad construction for many years. These fractional openings are soon crushed, and the broken pieces of the fractional checker flue fall down between the walls and the checkerwork. The expansion and contraction of the checkerwork will cause these pieces to jam, and this will cause the checkerwork to be crushed. As there will be an opening where the fractional checkers were, the remaining checkerwork will come loose and start shifting.

A HOT blast stove must have structural stability. It must also have the largest possible heat transfer rate of checkerwork. To accomplish these ends requires skilled balancing of brick shape, size, weight and arrangement. In this article the authors present data, much of them heretofore unpublished in English, which give a scientific basis on which to design a hot blast stove having the best possible characteristics. The authors are connected with the builders of the Simplex hot blast stove.

In the design of the Simplex hot blast stove the structural stability of the checkerwork was given paramount consideration. This did not, however, result in decreasing the heat transfer rate of the checkerwork. In the design of any heat transfer apparatus a careful analysis should be made of the physical properties of all the elements entering into its operation. In a hot blast stove the heating medium is the products of combustion of blast furnace gas; these products consist mainly of carbon dioxide and nitrogen. The cooling medium is air. In Table I the physical properties of gases at constant pressure are shown for different temperatures. It should be noted that with an increase in temperature from 32 deg. to 1830 deg. F. the thermal conductivity increases 247 per cent for nitrogen and 440 per cent for carbon dioxide; with the same increase in temperature the specific heat increases 6.15 per cent for nitrogen and 47 per cent for carbon dioxide. The fire clay checker brick is the medium in which the heat from the products of combustion is stored for heating the blast. The physical properties of checker brick are shown in Table II, and from an examination of this table the reader will find that the thermal conductivity and the specific heat increase very rapidly with an increase of temperature. With a change of temperature from 500 deg. to 2000 deg. F. the thermal conductivity will increase 49 per cent and the specific heat 28 per cent. From the above data it has been clearly shown that the heat transfer rate will be considerably higher in the high temperature section of the stove than in the low temperature section; this is due to the much greater thermal conductivities and specific heats of all the elements entering into the heat cycle.

95 Per Cent Efficiency Desired

In the past the determination of the checker brick thickness has been mostly a matter of guesswork, but now due to the research of E. D. Williamson, L. H. Adams[1] and H. Groeber[2] the correct brick thickness can be calculated with mathematical accuracy. The heat storage factor of a brick is the efficiency, and is defined as the ratio of the heat actually stored to that which would be stored if the conductivity of the brick were infinite. In determining the proper thickness of a checker brick an efficiency of more than 95 per cent should be chosen and due consideration of the thickness of the brick to withstand structural stresses should be considered. In curves shown in Fig. 1 the efficiency of bricks of different thickness are shown. This efficiency is based on a furnace equipped with four stoves, and the cycle is three hours on gas and one hour on blast. From these curves it can be seen that the efficiency of a checker brick 3 in. thick is 94 per cent, 2½ in. thick is 98.3 per cent and 2 in.

[1] Physical Review, No. 14, pp. 99-114, 1919.
[2] S. Springer, Berlin, 1926, pp. 40.

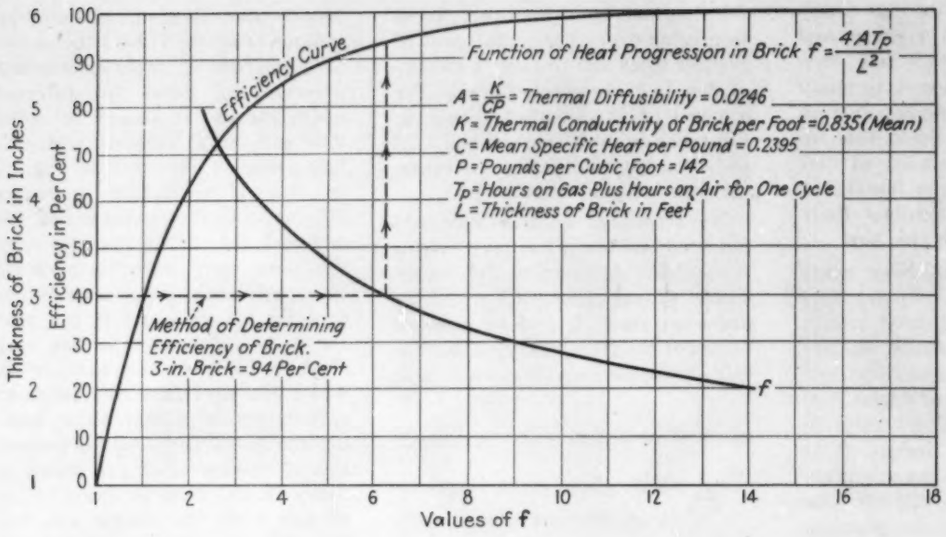

Efficiency Curve
Function of Heat Progression in Brick $f = \frac{4ATp}{L^2}$
$A = \frac{K}{CP}$ = Thermal Diffusibility = 0.0246
K = Thermal Conductivity of Brick per Foot = 0.835 (Mean)
C = Mean Specific Heat per Pound = 0.2395
P = Pounds per Cubic Foot = 142
Tp = Hours on Gas Plus Hours on Air for One Cycle
L = Thickness of Brick in Feet
Method of Determining Efficiency of Brick. 3-in. Brick = 94 Per Cent
f
Thickness of Brick in Inches
Efficiency in Per Cent
Values of f

FIG. 1—Efficiency of checker brick of different thickness, based on four stoves operating three hours on gas and one hour on air.

thick is 99.7 per cent. These values show that the use of checker brick having a thickness of less than 2 in. will not result in better heat regeneration. Checker brick of less than 2 in. will lack structural stability; moreover, these thin bricks are much more expensive because of the brickmakers' extras. In consideration of the above, any additional money spent for checker-brick flues of a thickness of less than 2 in. is unnecessary.

Heat transfer by convection is dependent upon laws of fluid flow. Osborne Reynolds[3] by his fundamental investigations established the fact that two types of flow, following widely different laws, might take place. The first type of flow is referred to as laminar or streamline flow. The second type of flow is referred to as turbulent flow. Reynolds investigation resulted in finding the transition from streamline to turbulent flow through the use of the following formula:

$$R = \frac{VDp}{u}$$

Where

V = velocity of stream in ft. per hr.

p = density of fluid in lb. per cu. ft.

u = viscosity of the fluid in lb. per ft. per hr.

D = 4 times the free cross-section of the flue in sq. ft. divided by the perimeter of the flue in feet.

R = Reynolds Number = 2320.

In Fig. 2 a curve has been plotted showing the velocities of transition for different size flue openings. In this country the velocities of the products of combustion in the checker flues will vary between 2.5 to 3.5 ft. per sec. The velocity in feet per second of the gas is referred to standard conditions of 32 deg. F. and 29.92 in. of mercury. From the curve of the critical ve-

[3] Transactions Royal Society, London, No. 174, pp. 935, 1884.

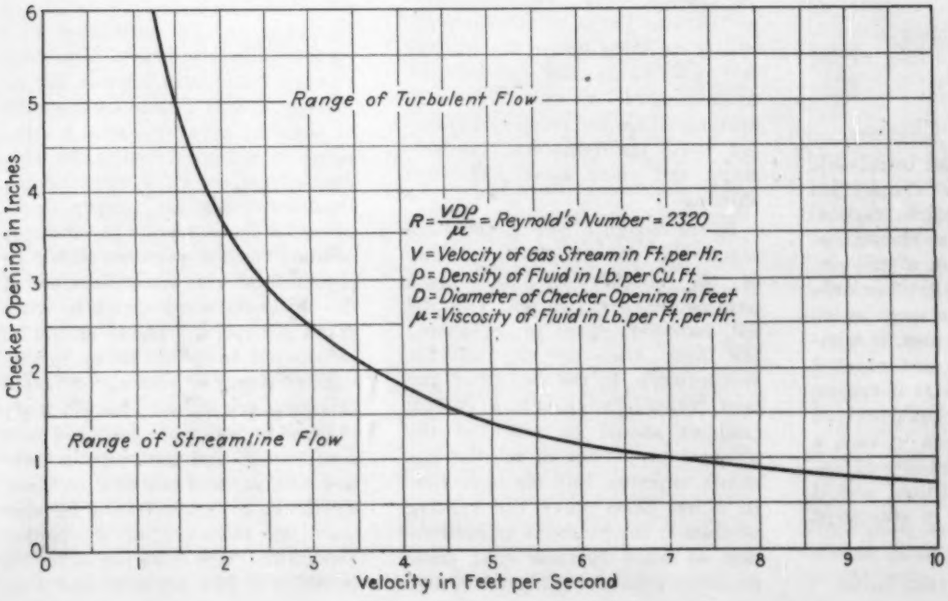

Range of Turbulent Flow
$R = \frac{VD\rho}{\mu}$ = Reynold's Number = 2320
V = Velocity of Gas Stream in Ft. per Hr.
ρ = Density of Fluid in Lb. per Cu. Ft.
D = Diameter of Checker Opening in Feet
μ = Viscosity of Fluid in Lb. per Ft. per Hr.
Range of Streamline Flow
Checker Opening in Inches
Velocity in Feet per Second

FIG. 2—Critical velocities of checker openings. The velocity of the gas in ft. per sec. is referred to standard conditions of 32 deg. F and one atmosphere pressure.

locity it can be seen that the smallest flue opening for a velocity of 3/5 ft. per sec., which will have turbulent flow, is approximately 2 in. and for 2/5 ft. per sec. is 3 in. The reader should note that as the flue opening decreases in size the velocity required to maintain turbulent flow increases very rapidly. It must be remembered that the gas stream in the Simplex hot blast stove is interrupted every 9 in. due to the staggering of the filler which causes a cross flow in the flues. To have turbulent flow in flues of an equivalent diameter of less than 2.5 in., staggered fillers or other means of baffling must be used.

Heat Transfer by Convection

Heat transfer to checker brick, both staggered and unstaggered, has been studied at the heat institute of the German steel industry in Dusseldorf by H. Kistner[4], who found that the surface heat transfer by convection for a non-staggered brickwork was equal to $\frac{1.26\sqrt{Vo}}{\sqrt[3]{D}}$; for staggered brickwork the heat transfer by convection was equal to $\frac{1.39\sqrt{Vo}}{\sqrt[3]{D}}$

Where

Vo = velocity in feet per second of air or gas corrected to standard conditions of 32 deg. F. and 29.92 in. Hg.

[4] Archiv. fur Eisenhuttenwesen, 3, II, 1929, pp. 751-768.

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FIG. 4—Heat transfer by radiation. The reason that the heat transfer is greater in a large flue is that the thickness of the gas layer is greater and therefore the surface will absorb more radiations.

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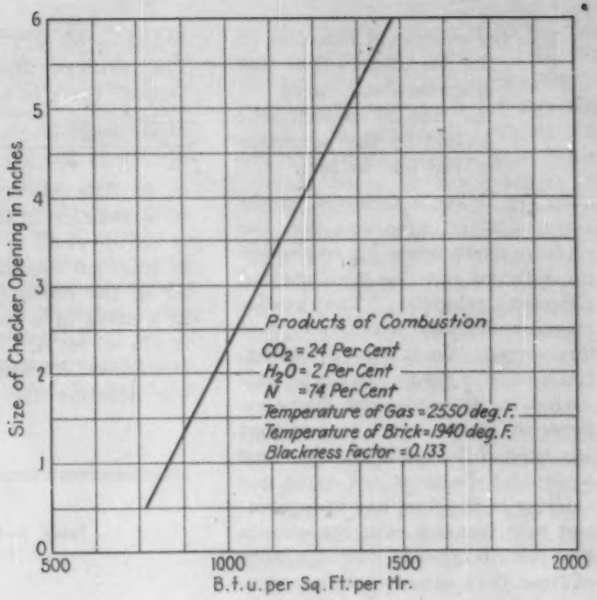
Size of Checker Opening in Inches
Products of Combustion
CO_2 = 24 Per Cent
H_2O = 2 Per Cent
N = 74 Per Cent
Temperature of Gas = 2550 deg. F.
Temperature of Brick = 1940 deg. F.
Blackness Factor = 0.133
B.t.u. per Sq. Ft. per Hr.

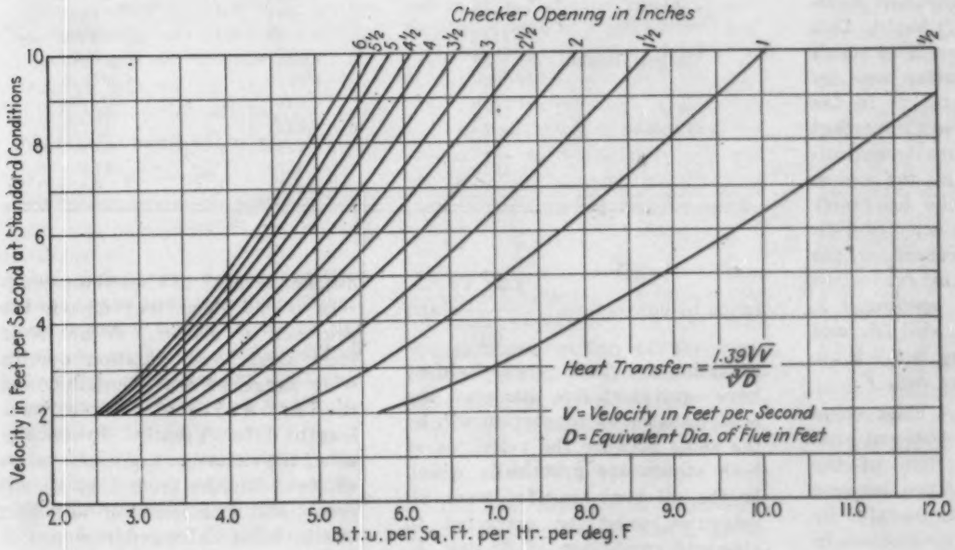
Checker Opening in Inches
Velocity in Feet per Second at Standard Conditions
Heat Transfer = $\frac{1.39\sqrt{V}}{\sqrt[3]{D}}$
V = Velocity in Feet per Second
D = Equivalent Dia. of Flue in Feet
B.t.u. per Sq. Ft. per Hr. per deg. F

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FIG. 3 — Curves showing surface heat conductance by convection for different velocities. Any type of flue, if it has the same equivalent diameter and same gas velocity, has an identical heat transfer rate.

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FIG. 5—Amount of heat transferred by convection and by gaseous radiation at different elevations in the checkerwork of a blast furnace hot blast stove. Checkerwork thickness is 2 in., and the flue openings are 4 in. square.

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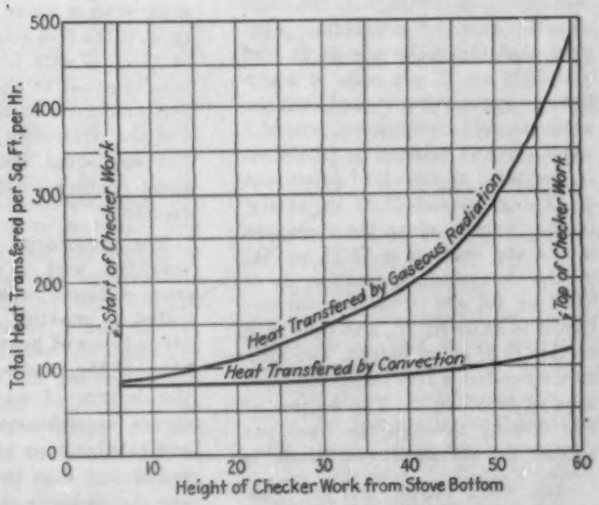

Total Heat Transfered per Sq. Ft. per Hr.
Start of Checker Work
Top of Checker Work
Heat Transfered by Gaseous Radiation
Heat Transfered by Convection
Height of Checker Work from Stove Bottom

D = the equivalent diameter of the flue=4 times the free cross-sectional area of the flue in square feet divided by the perimeter of the flue in feet.

In Fig. 3 are a series of curves using Kistner equations for the surface conductance by convection for different size flue openings and different velocities. The reader should understand that any type of flue opening, be it square, oblong, triangular or round, should be converted to its equivalent diameter. From the above it can be seen that any type of flue, if it has the same equivalent diameter and same gas velocity in the flue, has an equivalent heat transfer rate. Statements that certain types of flues are more efficient than others are incorrect, and these statements cannot bear scientific investigation. In the Simplex stove the equivalent diameter of the flues is 1.35 in. This diameter is small enough to result in a high heat transfer rate by convection. This factor D in the Kistner equation is very important because it expresses mathematically the degree which all the gas in the flue will touch the brickwork of the flues. At a velocity of 3 ft. per sec. at standard conditions, the surface conductance by convection of a flue with a 6 in. opening is 3, with a 3-in. opening is 3.8, and with a 1½-in. opening is 4.7 B.t.u. per sq. ft. per hr. per deg. F.

In the Simplex hot blast stove a uniform free cross-sectional area from top to the bottom of the checkerwork is maintained, because the same rate of heat transfer by convection can be obtained as in the so-called "zoned stoves," without any of the latter stove's disadvantages. In comparing the heat transfer rate by convection, consider that the shells are 22 ft. and that 7000 cu. ft. per min. of blast-furnace gas are burnt, and that the products of combustion are 1.5 times the gas volume, or 10,500 cu. ft. per min. at standard conditions of 32 deg. F. and 29.92 in. of Hg. In the "zoned" stove the free area in the top section is 71.17 sq. ft., in the intermediate section it is 58.26 sq. ft., and in the bottom section it is 42.69 sq. ft., and that each section is of equal height. The Simplex stove has a free cross-sectional area of 56.56 sq. ft. The volume of gas flowing through the flues per second at standard conditions is 10,500 ÷ 60 = 175 cu. ft. per sec. The average free area of the "zoned" stove is equal to

$$\frac{71.17 + 58.26 + 42.69}{3} = 57.37$$

sq. ft. The velocity of the products of combustion in the "zoned" stove is 175 ÷ 57.37 = 3.05 ft. per sec. at standard conditions. The velocity of the products of combustion in a stove of a uniform free area is 175 ÷ 56.56 = 3.09 ft. per sec. at standard conditions. Using Kistner equation for surface conductance by convection $= \frac{1.39\ Vo}{\sqrt[4]{D}}$ and assuming that both types of stoves have equivalent flue diameter, the heat transfer by convection will be the same because the velocities of both stoves are practically equal. In the all heat transfer work all velocities must be corrected to standard conditions of 32 deg. F. and 29.92 in. of Hg. In comparing a stove of uniform cros-sectional area with a stove of the "zoned" type, if the free cross-sectional area of the one with uniform cross section is equal to the average cross-sectional area of the "zoned" stove and the equivalent diameter of the flue are equal, both will have the same surface conductance by convection.

The superiority of having high velocities with a uniform free cross-sectional area can be substantiated by making an inspection of other types of heat transfer apparatus. If the reader should examine the designs of water tube boilers, steam superheaters, economizers, and tubular type air preheaters, he would find that their tube centers are the same in the high and low temperature zone, but that the tubes are staggered from row to row. These manufacturers have found that gases flow with the greatest turbulence when the tubes are staggered.

Heat Transfer by Radiation

Heat radiation and light radiation are considered to be electromagnetic vibrations which differ only in wave length and which travel through space with a velocity of 186,000 miles per second. These radiations differ from conduction of heat in that their progress is not dependent upon the presence of matter. A hot solid body sends out radiation over a wide range of wave lengths, and the intensity of different wave lengths differs greatly. Practically all of the radiation lies in the range of wave lengths from 1 to 15 microns, and such radiation is within the invisible infra-red region. A. Schack[5] was first to investigate the infra-red radiation of furnace gases rich in carbon dioxide and water vapor. He found that these two compounds showed absorption bands in the infra-red region, that is for wave lengths greater than 0.8 microns. About the same time practical measurements have proved the equations for the radiation of carbon dioxide gas. Lent and Thomas[6] found that the radiation of a four-foot layer of burnt blast furnace gas at 1812 deg. F. was at a rate of 9220 B.t.u. per sq. ft. per hr. In Fig. 4 are shown the calculated radiation for different checker flue openings. A perfect black body would have a blackness factor of 0.174, but from determinations of Lent and Thomas the blackness factor for fire clay brick is 0.133. From an inspection of

Table I—Physical Properties of Gases at Constant Pressure.

Gas	Temperature in Deg. F.	Thermal Conductivity (K) in B.t.u. Per Ft. Per Hr., Per Deg. F.	True Specific Heat in B.t.u. Per Cu. Ft., Per Deg. F.
Air	32	0.0137	0.0195
	930	0.0304	0.0201
	1830	0.0475	0.0207
Carbon dioxide	32	0.0081	0.0248
	930	0.0255	0.0329
	1830	0.0437	0.0364
Nitrogen	32	0.0137	0.0195
	930	0.0298	0.0201
	1830	0.0470	0.0207

[5] Zeit. Tech. Physik., 267-278, 1924.
[6] Ver. Dent. Eisenhut., 65, 1924.

the curve in Fig. 4 it can be seen that the amount of heat transferred by means of gaseous radiation from the products of combustion of blast furnace gas is very high. The heat transfer for a 1-in. checker opening will be at a rate of 800 B.t.u. per sq. ft. per hr. and for a 6-in. checker opening the transfer will be 1475 B.t.u. per sq. ft. per hr. The reason that the heat transfer is greater in a large flue is that the thickness of the gas layer is greater and therefore the surface will absorb more radiations. Schack has determined that of the total heat transferred in a blast furnace hot blast stove approximately 50 per cent is transferred by radiation and that this heat transfer takes place in the upper half of the stove.

In Fig. 5 curves showing the amount of heat transferred by convection and gaseous radiation have been plotted for different elevations in the checkerwork of a blast furnace hot blast stove. The thickness of the checkerwork in this stove is 2 in. (50 mm.) and the flue openings are 4 in. square (100 mm.). The above curves[7] have been converted from the metric system of units into the English system of units. From an analysis of the above curves the total heat transferred at the bottom of the stove is 85 B.t.u. per sq. ft. per hr.; of this 80 B.t.u. per sq. ft. per hr. is transferred by convection and 5 B.t.u. per sq. ft. per hr. is transferred by gaseous radiation. At an elevation of 35 ft. above the stove bottom the total heat transferred is 167 B.t.u. sq. ft. per hour.; of this 85 B.t.u. per sq. ft. per hr. is transferred by convection and 82 B.t.u. per sq. ft. per hr. is transferred by gaseous radiation. At the top of the checkerwork at an elevation of 59 ft. from the bottom of the stove the total heat transferred is 480 B.t.u. per sq. ft. per hr.; of this 120 B.t.u. per sq. ft. per hr. is transferred by convection and 360 B.t.u. per sq. ft. per hr. is transferred by gaseous radiation. From the above values the great importance which gaseous radiation plays in the total heat transfer of a hot blast stove can be seen as the rate of heat transfer by radiation increases rapidly with an increase in temperature. The weight of the checkerwork in the high temperature section of the stove should be high so as to have available sufficient brick weight to absorb this great amount of heat.

[7] Mitt. Warmestelle Verein Deut. Eisenhutt., No. 82, 1925.

Table II—Physical Properties of Checker Brick (N. F. Norton refractories)

Temperature in Deg. F.	Mean Thermal Conductivity in B.t.u. per Sq. Ft. per Hr. per Deg. F. per In.	Mean Thermal Conductivity in B.t.u. per Sq. Ft. per Hr. per Deg. F. per Ft.	Mean Specific Heat B.t.u. per Lb.
500	7.5	0.625	0.207
1000	9.1	0.759	0.225
1500	10.4	0.866	0.244
2000	11.2	0.934	0.265
2500	11.9	0.991	0.288

Heat Capacity

The heat capacity of a hot blast stove will depend on the distribution of checker brick weight from the top of the stove to the bottom of the stove.

In the Simplex hot blast stove the free cross-section area of the checker flue opening is uniform from top to botom and the brick volume is 72.8 per cent of the checker volume. In the stove, which was previously referred to, the free cross-sectional area decreased from top to bottom. The brick volume of the top section is 66.4 per cent, for the intermediate section it is 72.5 per cent and for the bottom section it is 79.8 per cent. As good fire clay checker brick weighs 142 lb. per cu. ft. the weights of the above checker works are as follows: The weight per cubic foot for the Simplex stove is 103.5 lb. per cu. ft. The weight per cubic foot for the top section of the "zoned" stove is 94 lb., for the intermediate section it is 103 lb. and for the bottom section it is 113.3 lb. per cu. ft. of checkerwork. In considering that the thermal conductivites and mean specific heats of the products of combustion, the air, and the fire clay checker brick increase rapidly with an increase in temperature and that the total heat transferred is much greater for the checkerwork at the top of the stove than the checkerwork in the bottom of the stove, due to the great amount of heat transferred by gaseous radiation in the top checkerwork and the small amount transferred by gaseous radiation in the checkerwork in the bottom of the stove and also the fact that the heat transferred by convection is greater at the top than at the bottom because of the greater temperature differential between the checkerwork and gases, the weight per cubic foot of brick in the checkerwork should be greater at the top than at the bottom of the stove.

From the basis of heat capacity, a pound of checker brick at the top of the stove subjected to a temperature of 2000 deg. F. will hold 8.53 times as much heat as a pound of checker brick subjected to a temperature of 300 deg. F.; also at 2000 deg. F. the rate at which the brick will absorb heat from the gases will be greater per degree temperature differential because of grater thermal conductivities of the gases and checker brick. Another advantage of a high uniform checkerwork weight over a checkerwork when the maximum checker weight is in the cold part of the stove is that due to the greater brick weight in the high temperature part of the stove the heat from the gases will be held at their highest temperature, whereas in the "zoned" stove, due to lack of high brick weight at the top, the heat of the gases will be absorbed in the colder section where the weight is greater thereby resulting in the loss of temperature potential. A B.t.u. released at 2000 deg. F. is worth much more than a B.t.u. at a temperature potential of 1000 deg. F.

The heat capacity of a hot blast stove will also depend on the distribution of this brick weight in the checkerwork. The thickness of the fillers should not be less than the flue walls, and its thickness should be uniform so as not to heat up or cool off more rapidly than the flue wall.

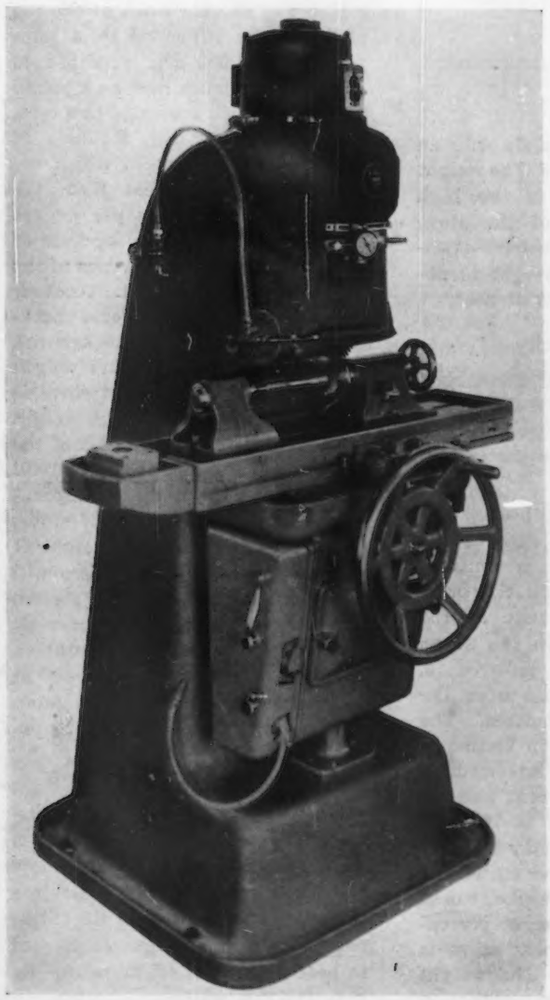
Gears Finished by Crossed Axes

IN a meeting of gear manufacturers, it is unnecessary to dwell on the difficulty of reproducing in steel the mathematics of gear design. Those of us with automotive experience, especially, are painfully aware of the great number of contingencies that are apt to rob us of our share of this life's tranquillity.

We know that no practical method of gear cutting can consistently produce a mathematically perfect product. The normal errors are tooth profile, index, eccentricity, helical angle and tooth finish, all measured usually in tenths of an inch. Despite their microscopic order, however, these errors are apt to be serious, especially in a world which has suddenly become acutely conscious of gear noise.

The object of rotary crossed axes shaving, the subject of our present discussion, is the economical reduction of gear errors to a negligible value—this by correcting the proportions and finish of the gear teeth. The result is less gear noise, longer gear life and more accurate mechanical operation.

One of the basic ideas behind this method of gear finishing is the crossing of the axes of cutter and work gear. The history and background of this procedure was outlined at a previous meeting of the American Gear Manufacturers Association [see THE IRON AGE of July 6, 1933] in connection with lapping.



AT LEFT

FIG. 1—Rotary gear finisher. Crossing of the axes of cutter and work gear is a basic feature.

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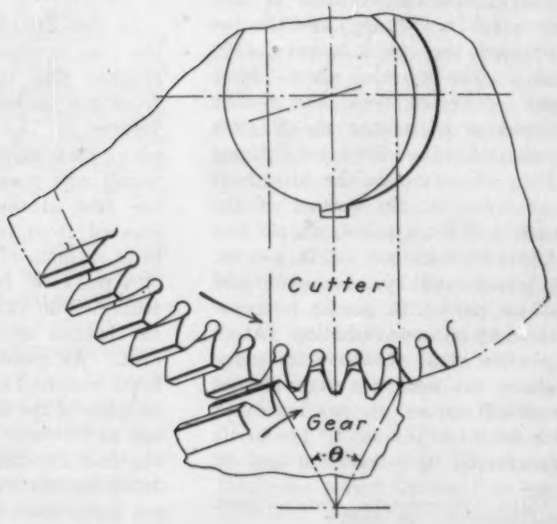
BELOW

FIG. 2—Sketch of gear and cutter in mesh. The angle made by their axes is equal to the difference of their helical angles, normally from 10 to 15 deg.



Shaving Process

By R. S. DRUMMOND
President, National Broach & Machine Co., Detroit

THE gear tooth finishing process here described was developed to provide an economical means of correcting inevitable errors in the manufacture of spur and helical gears, and in doing so to improve the operating efficiency, reduce gear noise, and lengthen gear life. The light contact pressure required in cutting is a feature of the crossed axes shaving process. The machine itself was introduced two years ago, but the discussion herewith, abstracted from Mr. Drummond's address at the recent meeting of the American Gear Manufacturers Association, gives further details of the process.

In crossed axes shaving, the work gear is rotated under only slight pressure with a special cutter or tool in the form of a gashed helical gear, the work gear and the cutter having different helical angles.

The angle made by their axes in the machine set-up is equal to the difference in their helical angles, normally from 10 to 15 deg., although this range may be extended on both sides of the limits given. The cutter is normally mounted with its center over the intersection of the axes of the two shafts to assure correct tooth profile and helical angle in the gear being cut.

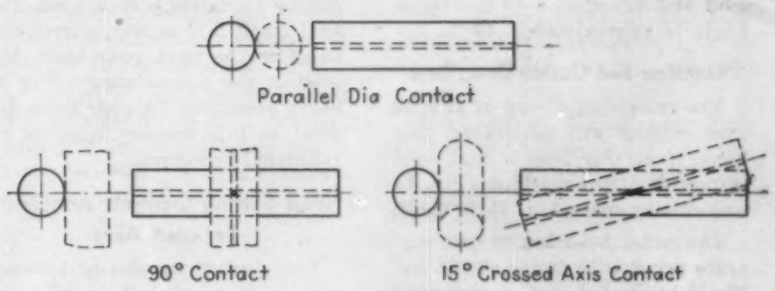
The relation of the axes compensates for the variation in sliding action due to the involute roll. As gear and cutter teeth are brought together cutting continues toward the pitch line up to the center point and in the reverse direction as they pass that point and separate. Thus uniform cutting is assured over the entire tooth profile.

Minimum Pressure in Cutting

Cutting can be rapidly increased by spreading the angle between the axes, but this tends to sacrifice guiding action and to reduce the width of the contact zone. Conversely, guiding action can be increased by reducing the angle between the axes, but this rapidly reduces the freedom of cutting until at a zero angle cutting is replaced entirely by a burnishing action.

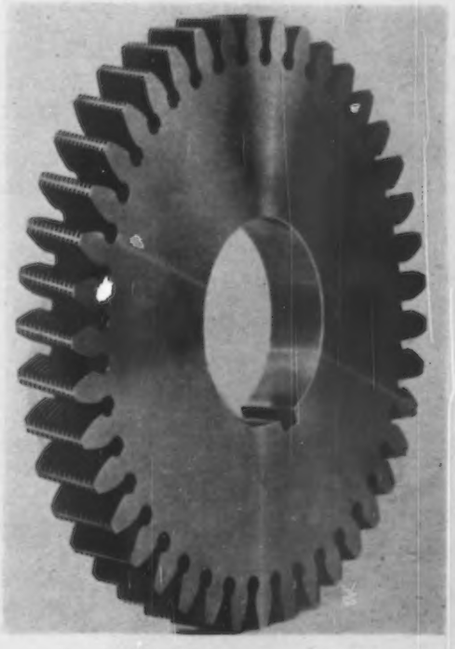
A real value in crossing the axes is the limiting of the contact pressure required in cutting and the accurate guiding of the cutting edges of the gashed tool.

When two parallel cylinders of the same length are forced together, their contact surface is a rectangle the length of which is the length of the cylinders and the width of which varies, of course,



ABOVE

FIG. 3—Contacts between cylinders. The uppermost shows parallel cylinders; the next, 90-deg. contact; and the lowest, 15-deg. crossed axis contact.



AT LEFT

FIG. 4—In appearance the shaving tool is like a normal helical gear gashed at a right angle with its axis. The tooth base clearance not only facilitates gashing, but permits unrestricted flow of the chip-flushing lubricant.

with their diameters, contact pressure and elasticity. As the angle of these cylinders is increased from zero to 90 deg., the contact plane remains a parallelogram but its area steadily diminishes to a minimum at 90 deg.

It is obvious also that as the angle between the axes is increased it will be necessary to gradually decrease the total pressure between the cylinders if the unit pressure on the plane of contact is to remain constant.

At a crossing angle of 10 to 15 deg., the required cutting pressure is therefore only a small fraction of what it would have to be if the axes were parallel.

It is true that in the case of the cylinders above-mentioned, the contact surface is parallel with the axes, while the actual contact of two mating gears is along the tooth profile in a plane more nearly vertical to the gear axes. That, however, does not change the working pressure relationship and its contingency on axial angularity. The pressure normally exerted between gear and cutter at a 10 to 15-deg. angle is approximately 40 lb.

Machine and Cutter Described

The remaining theory of crossed axes cutting will be clearer, perhaps, if at this time a high spot inspection of the machine (Fig. 1) and cutting tool (Fig. 4) is made.

The cutter head has its own separate drive, with motor at the top. The table is fed and reciprocated by its own motor, which is smaller, and the pressure lubrication system is driven by a third motor.

The table feed mechanism, located at the left-hand end, raises the table vertically at the end of each stroke as the cutter passes out of pressure contact with the work gear. Each increment of vertical feed is under complete control.

At the right-hand side is located the Telechron timing mechanism which controls the number of horizontal table strokes. The machine can be set to stop automatically when the desired number of cuts has been taken. Furthermore, any number of idling strokes may be interspersed in the cycle of operation.

With the machine on cutting stroke, the surface produced on the work gear has minute lines traveling up the tooth from bottom to top. These indicate the spacing of the cross travel of the work per revolution. Inasmuch as the cutter contacts the work at a different point on each stroke, these lines are completely removed by one or more idling strokes after the actual cutting operation is completed. The final result is a smooth, mirror-like finish on the work gear tooth, but without the compression effect of heavy pressures. A gear tooth finished in this manner requires no additional processing.

Head Setting Controls Angularity Between Axes

The correct angularity between axes is accomplished in the machine head setting. In addition to the ordinary vernier scale for setting the head, an accurate indicator is also provided. This bears on a button, so that when the first sample gear is checked, any slight variation in angle can be corrected by revising the head setting.

The work gear mounted on live centers is driven and guided by the cutter; no other drive connection exists between them. No dependence is placed on the accuracy of gear trains or other mechanical elements in this operation. The profile of the gear, its angle, index and eccentricity are determined solely by similar functions of the cutter itself.

At the end of each table stroke, the direction of cutter rotation is reversed; this assures similar characteristics in the profile of each side of each tooth.

Cutter speeds are considerably higher than might normally be expected. In many cases cutters are run at 400 surface ft. per min.

The rough gashing of a gear invariably leaves certain cutting strains in the surface of the gear teeth. These strains, relieved in the heat-treating operation, are often responsible for final distortions which appear as errors in the finished gear. It is important to know, however, that the shaving process, with the gear operating at high speed and light contact pressure, almost completely eliminates these initial cutting strains. Minute, hair-like shavings are taken from the gear tooth surfaces in a manner much the same as that effected by a fly cutting tool. Obviously the finer the cuts made, the less pressure is required between cutter and work.

Cutter Error Within 0.0003 In.

The tool itself (Fig. 4) looks like a normal helical gear gashed at right angles with its axis. The gashes extend from top to bottom of each tooth with a clearance space at the base of the tooth. This tooth base clearance not only provides unrestricted flow of lubricant to wash out the chips, but also facilitates the gashing operation itself.

It has been found possible to produce cutters with an accumulative error not to exceed 0.0003 in. Present practice is the result of an extensive program of research and is fully covered by patents.

The life of a cutting tool is unusually high. Normally, from 6000

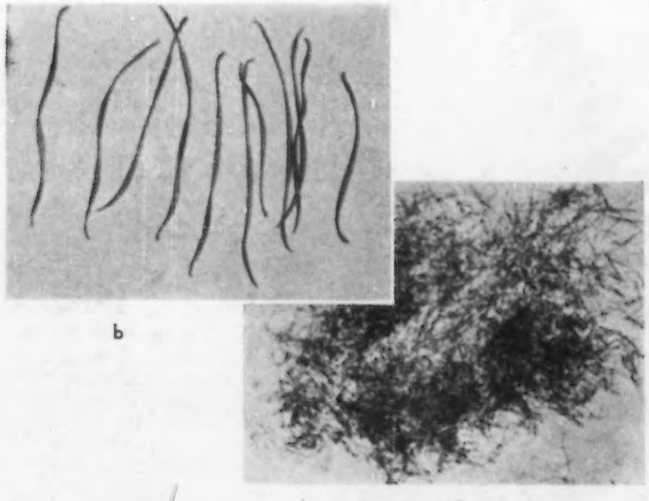


FIG. 5—(a) Appearance of a pile of chips resulting from normal operation of the rotary gear finisher. (b) Cluster of chips magnified four times to show character of metal removed in finishing a gear.

to 12,000 work pieces can be produced before it is necessary to regrind the cutter. In normal pitch sizes, a cutter may be reground a number of times. In five-pitch cutters, seven to ten regrinds are practicable, thus making a total of 42,000 to 100,000 work pieces per tool.

As previously stated, chips shaved off the gear tooth surface are hair-like in dimensions (Fig. 5). They are normally twisted from end to end instead of being coiled in clock-spring fashion. This is the result of the angle setting of the axes of cutter and gear.

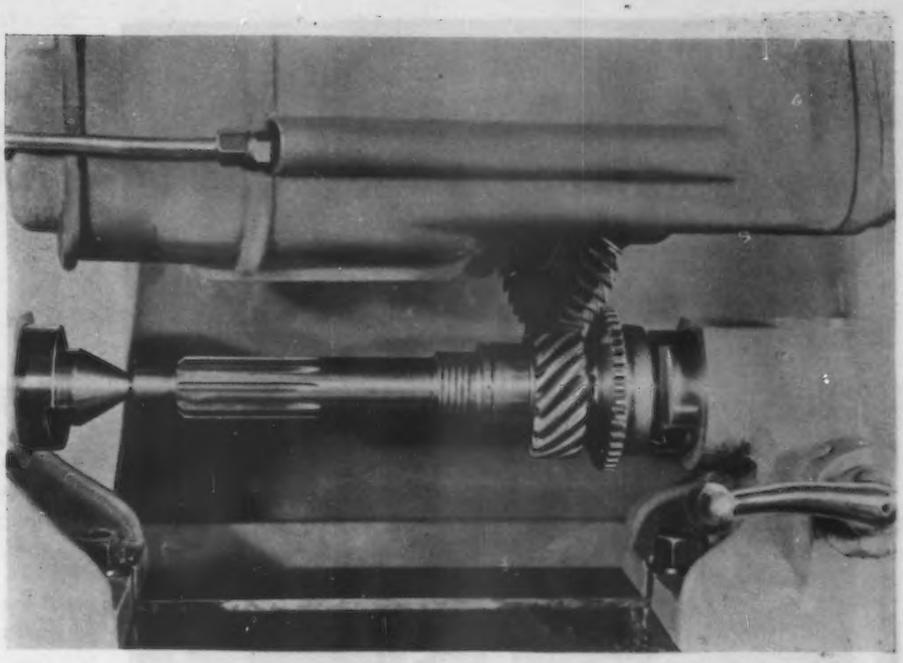


FIG. 6—Close-up showing work gear in operating position. The gashed helical cutting tool is shown just above and mating with the work gear.

The prompt evacuation of these hair-like chips presented a problem in the development of this machine. Being so light the chips are easily carried in suspension by the cutting lubricant. Consequently a very careful straining of the lubricant is necessary to prevent chip return to the cutter faces. A continuous flow of lubricant is provided on both sides of the cutter contact in order to rapidly wash out all chips immediately after they are formed. A relatively high oil pressure is used for this purpose.

A practical limitation on crossed axes shaving occurs with shoulder gears of different diameters and in close proximity. Lack of space between the individual gears obviously limits the angle at which the axes may be crossed. With a space between gears of ¼ in. and with differences in diameter of 1 in. or more, cutting can be accurately done.

Each case in this category must be studied individually to determine the most practical axis angularity.

Pipe Welding Continued Throughout Dust Storms

ALTHOUGH hampered by dust storms, high winds and occasional rains, over 160 miles of pipe were welded recently in 29 days by H. C. Price, Inc., Bartlesville, Okla., using equipment manufactured by Lincoln Electric Co., Cleveland. The average was over 70 welded joints per day. The work was on the first section of a new pipe line from Enid, Okla., to Hutchinson, Kan., for the Cimarron Pipe Line Co., and is being continued at the rate of five miles per day. The finished line will extend to Superior, Neb., and will transport gasoline from Oklahoma points to Midwest consuming centers. The estimated carrying capacity is 20,000 bbl. per day. Six-in. diameter, 14-lb. seamless steel pipe, averaging in length 37½ ft., is specified; joints are of plain butt type.

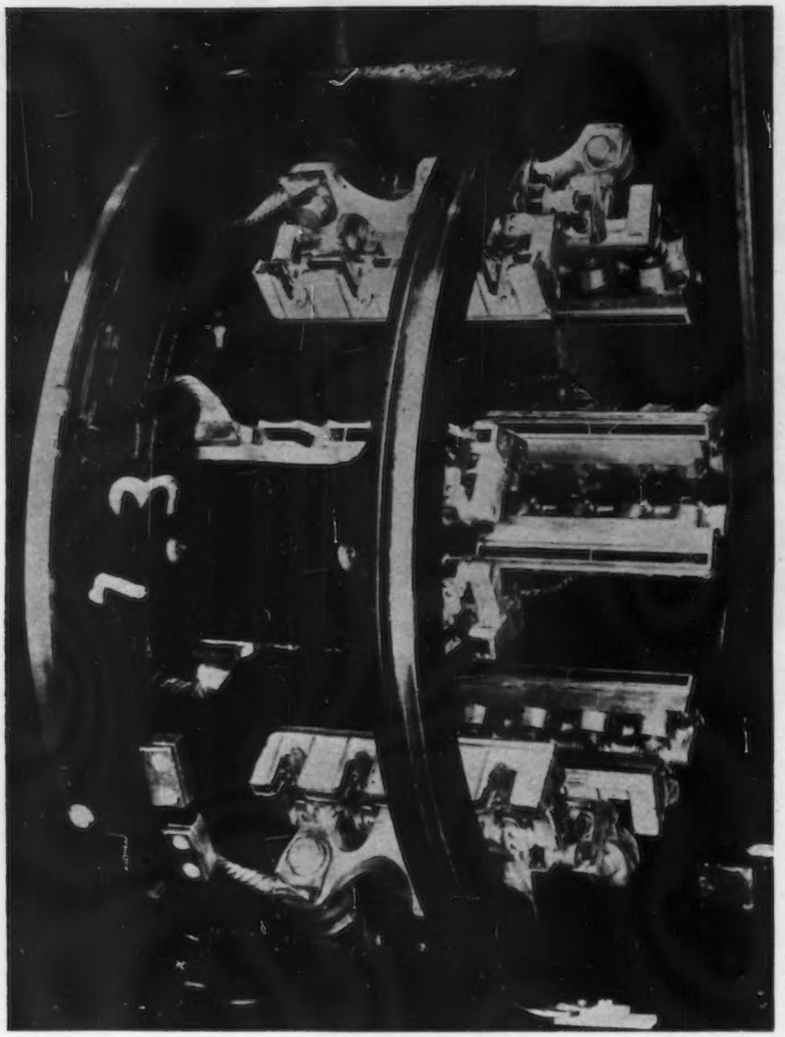


FIG. 1—Complete locomotive motor rocker ring containing phosphor-bronze overlays deposited by the metallic arc process.

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Electric Arc

o o o

By CHARLES H. JENNINGS

Research Laboratories, Westinghouse Electric & Mfg. Co., East Pittsburgh.

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ESSENTIAL factors in depositing bronze overlays on to steel by the metallic arc process are outlined, and use of an automatic welding head for depositing the bronze on rocker rings for the new Pennsylvania Class GG-1 locomotive motors is described.

IN many cases in machine construction it is necessary to have two surfaces in sliding contact. To assure satisfactory operating characteristics in such cases it is desirable to use dissimilar metals so that there is no danger of destroying the contact surfaces by seizing or excessive wear.

Use of bronze against steel in cases of the above type is a well recognized combination. Bronze affords a hard wear-resisting surface that does not readily seize when used in sliding contact with steel.

The rocker rings on the new Pennsylvania class GG-1 locomotive motors now being fabricated by the Westinghouse Electric & Mfg. Co. are typical examples of the use of a bronze-steel combination. The rocker rings support the motor brushes and are designed so that they may be rotated to periodically inspect the brushes. Two rings of bronze on the rocker rings form the sliding contact surfaces between the rings and the weld-fabricated steel frames. Fig. 1 shows a complete rocker ring and Fig. 2 gives details of design, including the location of the bronze overlays.

The bronze in this case is essentially an overlay deposited by the metallic arc process. The many advantages of depositing bronze on to steel as compared with attaching individual bronze rings by keys, screws or wedges is obvious. It is the purpose of the following discussion, therefore, to outline the fundamentals governing the successful deposition of bronze overlays on to steel.

Welding Technique

Both the metallic arc and carbon arc processes can be used to deposit welding-bronze on to steel, but the former is the only one that will be considered in this article. In connection with the metallic arc process both manual and automatic welding are suitable.

Welding Bronze Overlays on to Steel

When depositing welding-bronze on to steel there are two important points to remember; first, the two metals must be *brazed* and not *fused* together, and second, the deposited bronze must be cooled quickly enough to prevent porosity as a result of liquation (see following discussion).

If the bronze and steel are fused together, some of the iron will be absorbed by the bronze and the resultant deposit will be porous and will have a burnt and pitted appearance. By brazing the materials together none of the iron is absorbed into the bronze and this trouble does not occur. Fig. 3 shows the difference in soundness between bronze deposits fused and brazed on to steel.

To braze the bronze on to the steel it is important that the steel is not melted but only heated to the brazing temperature, which is a dull red heat. This is done when using the metallic arc by allowing the deposited bronze to flow about 3/16-¼ in. ahead of the arc at all times (see Fig. 4). This procedure directs the arc on to the deposited bronze and not on to the steel. The result is that the steel is heated by conduction from the molten bronze and not by direct contact with the arc. This procedure makes it possible to heat the steel to the desired brazing temperature and still not melt it.

The matter of liquation is a function of the rate of solidification of the deposited bronze*. Some alloys are homogeneous solid solutions while others are mixtures of two or more solid solutions containing different proportions of the constituent metals. In the latter cases the different solid solutions have different melting points and the alloys do not freeze or melt uniformly, but first one and then the other of the two or more solutions. This selective melting causes difficulty in hot working the metal; similarly, selective freezing causes trouble resulting in cracks, lines of weakness or porosity.

Welding-bronze may show porosity as a result of liquation if the weld pool is too large or the freezing time too slow. If the deposited bronze is cooled quickly enough, selective freezing will be held to a minimum and the weld metal will be dense and strong.

The time required for the molten metal to solidify can be controlled by the diameter of the welding electrode, the welding current, the rate of travel, the width of the bead and the temperature of the plate on to which the bronze is deposited. If the above variables are properly adjusted, no porosity will be experienced from liquation.

Welding Procedure

When depositing welding-bronze on to steel by the metallic arc process it is essential that the surface of the steel be clean. All mill-scale, heavy rust, paint, grease and other foreign matter must be removed. Excellent results are obtained when depositing the bronze on a dry machined or ground surface. If the bronze is deposited on a dirty or greasy surface, the deposit is apt to be porous and the resultant heavy slag covering the weld will cause surface pits.

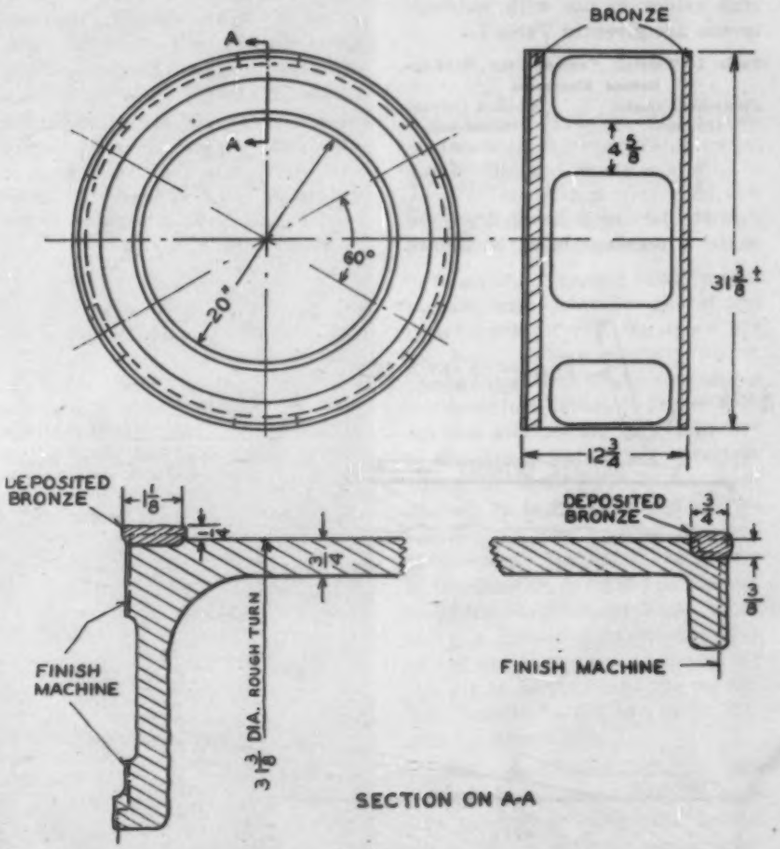

FIG. 2—Sketch showing design of rocker ring, including location of the bronze overlays.

*See "Welding Copper, Brass and Bronze," a paper by Ira T. Hook, presented at the welding conference held at Iowa State College, Ames, Iowa, Jan. 16, 1929.

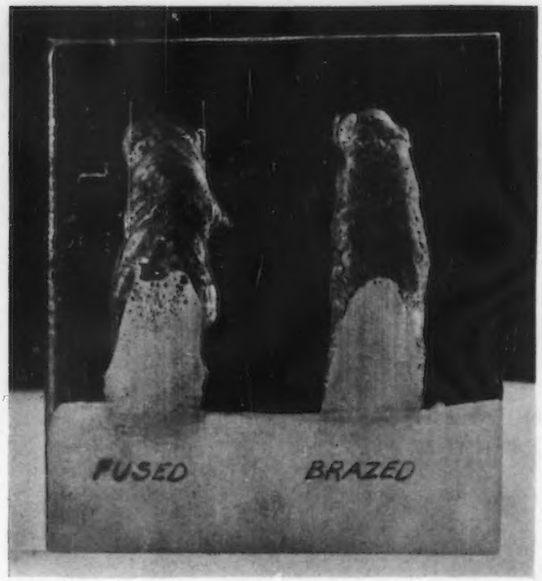

FIG. 3—Comparison of the soundness of bronze deposits when fused and when brazed on to the steel.

Reverse polarity (electrode positive) should be used when depositing welding-bronze. The arc voltage should be 35 to 40 volts. The welding current will depend upon the diameter of the electrode, the heat capacity of the parts and whether the deposit is being put upon steel or a previous bronze deposit. The recommended current values to use with welding-bronze are given in Table I.

Table I—Welding Currents for Welding-Bronze Electrodes

Electrode Diameter (Inches)	Welding Current (Amperes)
1/8	90-110
5/32	120-140
3/16	140-180

If the bronze is being deposited on to a previous layer of bronze the current values can be increased about 10 per cent above those given in Table I.

The sound of the welding operation is an excellent guide as to whether or not it is being done correctly. When the arc voltage and welding current are correct and the welding operator is allowing the deposited metal to flow ahead of the arc properly, the electrode tip will melt off in the form of large drops. These drops are blown off the electrode tip at regular intervals and are accompanied by a loud popping sound. Consequently, when the welding procedure is being carried out properly it will issue a regular series of loud "pops."

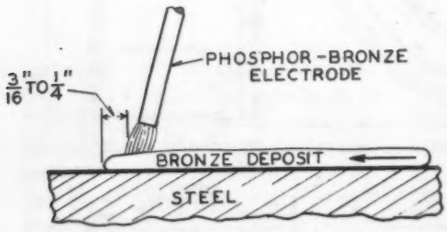

FIG. 4—Correct position of electrode when depositing bronze on to steel by the metallic arc process.

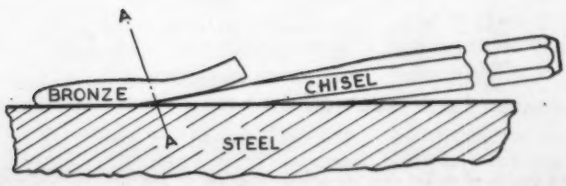

FIG. 5—Method of checking soundness of bronze deposits.

If the arc length is not maintained constant the "pops" will come at irregular intervals. If the deposited metal is not allowed to flow ahead of the arc and/or the arc is held too short, the steel will be melted. This condition will be accompanied by a loud hissing sound rather than a series of explosions at regular intervals.

In manual welding it is necessary, of course, to stop and change electrodes during the welding operation. When starting to weld with a new electrode the arc should be struck on the previous deposit about ½ or ¾ in. behind its end. This procedure insures against melting the steel, which would be the result if the arc were struck upon the steel, and against incomplete union between the steel and bronze at points where the electrodes are changed or the arc is broken.

The operation of brazing the bronze on to the steel and the manner in which it is accomplished make it difficult sometimes to determine whether or not the steel has been heated high enough to develop the proper bond between the parts. It is often advisable, therefore, when starting a new job to check the bond between the parts by chiseling a section of the bronze bead off and noting the appearance of the steel surface. The bead will come off fairly easily if the chisel is directed along the line of union between the metals (Fig. 5). By breaking the bronze bead across the plane A-A (Fig. 5), it is also possible to determine the soundness of the deposit.

When the metals have been properly brazed together the exposed surface of the steel will contain a thin coating of bronze over its entire surface. When the two metals are not properly brazed together there will be spots of steel that are not covered by the thin bronze coating and there will be numerous small semi-spherical pockets on the brazed surface which will vary greatly in size and be non-uniformly distributed. These little pockets are sometimes noticeable when the junction line is machined.

Joint Design

Depositing welding-bronze overlays on a flat surface is an easy matter and in general will not give trouble. The greatest difficulty encountered will be that of making a bead of uniform width when the

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deposit is built up in two or more layers. The extreme fluidity of the bronze causes it to run over the sides of the previous layers unless dams are used. Heavy copper makes a suitable dam.

In cases where bronze is deposited at the edge of a plate (Fig. 6b) it is of course essential that a dam be used to prevent it from running over the edge.

When the bronze is to be deposited into a groove in a plate it is essential that sharp corners and narrow grooves are not used. Exterior corners are easily fused into the deposit while reentrant corners

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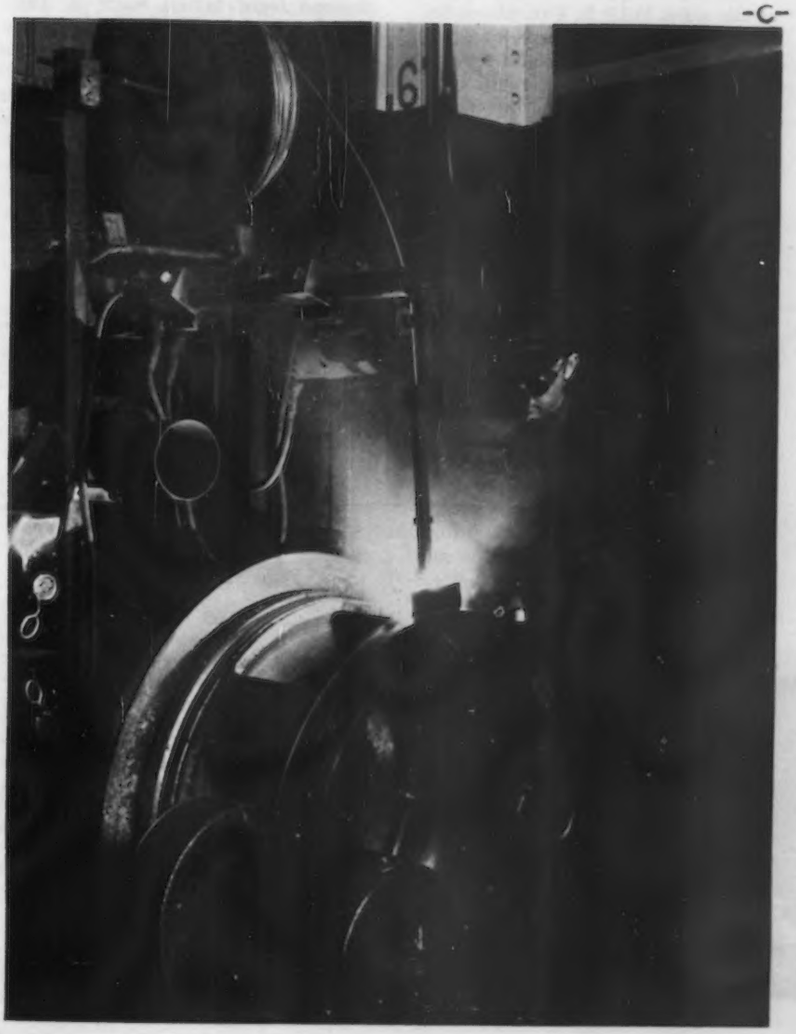

FIG. 7—Depositing phosphor-bronze on to steel rocker rings by the automatic metallic arc process. The rocker ring rotates under the welding head.

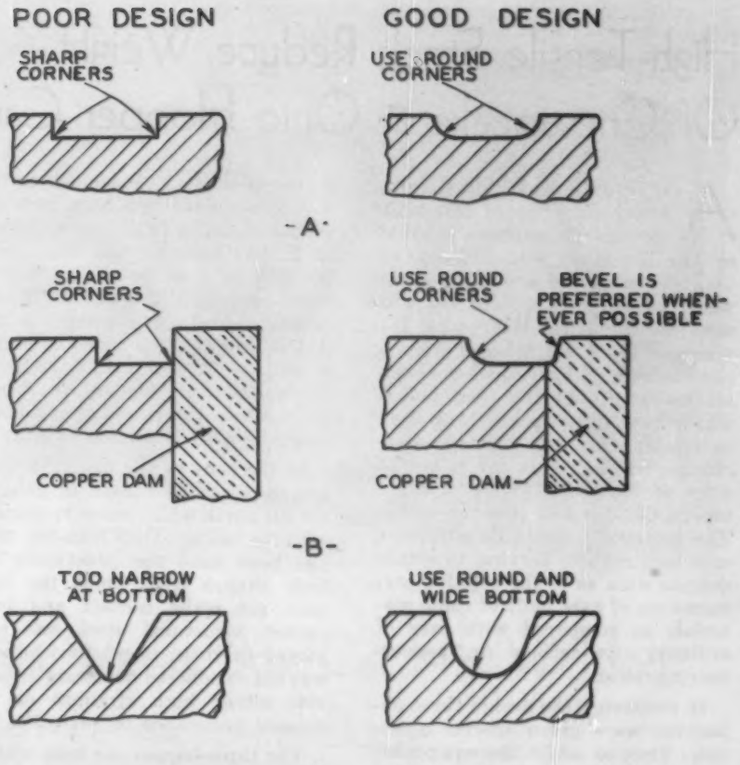

FIG. 6—Correct joint designs to use when depositing bronze overlays.

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and narrow grooves foster cold shuts and incomplete union between the bronze and the steel. Fig. 6 gives a few examples of good and bad groove designs into which bronze is to be deposited.

When using copper dams in connection with joint designs of the type shown in Fig. 6b, there are two points to be remembered: first, the chilling effect of the dam causes the deposited bronze to freeze with surface pits on the side adjacent to the dam. This is not a serious condition, however. If at least ⅛ inch is to be machined off the surface, all the surface pits will be removed. Second, if the groove is too deep or narrow there is apt to be trouble from arc blow. When using a copper dam on one side of the arc there is a tendency for the arc to blow toward the copper. This results in the arc being frequently blown out.

The rocker rings of the new Pennsylvania class GG-1 locomotive motors, as mentioned before, are a typical example where weld-

(CONTINUED ON PAGE 178)

High-Tensile Steels Reduce Weight Of Chesapeake & Ohio Hopper Car

A NEW design of light-weight, heavy-duty hopper car, built for the Chesapeake & Ohio by the American Car & Foundry Co., was exhibited at Chicago last week, in connection with the annual meeting of the Mechanical Division of the Association of American Railroads. Features have been incorporated in this equipment which have never before been used in freight cars for general interchange service. This car is one of a lot of ten built largely of high-tensile Cor-ten and Man-ten steels. The railroad intends to put these cars into regular service, to obtain definite data as to the relative performance of cars built of these materials as compared with cars of ordinary low-carbon or copper-bearing steel.

In preparing the design three objectives were given special attention: first, to adapt the equipment to the particular conditions and requirements of service on the Chesapeake & Ohio; second, to afford an opportunity for tests, under actual service conditions, of new materials and appliances; and, third, to include the latest developments and standards in those features which are not of special construction.

These cars, mounted on 5½ x 10-in. trucks, have been made to carry 67 tons of coal, the light weight being 34,600 lb. and the load limit 134,400 lb. The reduction in weight, compared with the last previous Chesapeake & Ohio hopper car, is approximately 4 tons and, compared with the estimated weight of the proposed A.A.R. standard hopper car, approximately 3½ tons. The ratio of payload to gross weight is 79.5 per cent.

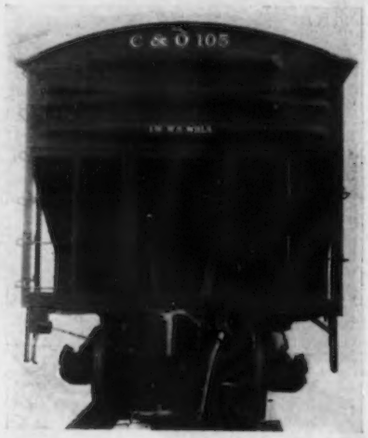
The weight of a large proportion of the coal carried by the Chesapeake & Ohio is approximately 54 lb. per cubic foot. Inasmuch as the A.A.R. standard cars have been designed on the basis of coal weighing 52 lb. per cubic foot, it was found possible to provide the necessary cubic capacity within the width and height clearances adopted for the A.A.R. standard car with the length of only 33 ft. 6 in. inside the body. The use of three hoppers was found desirable to obtain maximum cubic capacity with minimum length.

In the body of the car USS Cor-ten steel has been used in general for all parts which come in contact with the lading. USS Man-ten steel has been used for practically all body shapes with which the load does not make contact and low-carbon structural steel was employed in those members where it was not considered necessary to provide either high strength or increased resistance to corrosion.

The three-hopper car body which, at the sides, is 10 ft. 8 in. above the rail, has a top bulb angle of Man-ten of 5-in. x 2½-in. 8.5-lb. section. The ends, of the Dreadnought type, curve upward toward the center, where the height is 11 ft. 9¼ in. The end is reinforced with a 3-in. x 3-in. x ¼-in. angle of Man-ten. For the side stakes 5-in. x 2½-in. 7.3-lb. bulb angles of Cor-ten are used, as this section necessitates only one row of rivets at each post. The side sills and end sills are 5-in. x 3½-in. x ¼-in. angles of Man-ten. In the center sill the railroad desired to maintain the cross-sectional area of the A.A.R. standard construction and therefore adopted the "Z" 26 section of structural grade carbon steel for this member.

The body bolsters are built up of Man-ten with 3/16-in. web plates, 5/16-in. bottom cover plates, 5-in. x 3½-in. x ¼-in. bottom angles and 3½-in. x 2¼-in. x ¼-in. vertical stiffening angles. Substantial stiffening for the body is provided at the cross-hoods by 3/16-in. cross-ridge gussets and cross ridge and side-stiffeners formed from Cor-ten sheets, coped out for lightness, which are bent at their upper edges to form an oval cross-section, with the edge riveted to the plate where it overlaps. The body side sheets are ⅛ in. thick and slope sheets, hopper sheets and center sill and cross-ridge sheets 3/16 in., all of Cor-ten. The main side sheets extend in one piece from the bolster to the center of the car, where they are lapped and riveted to the side stake. In order to maintain the proper slopes on all three hoppers without lengthening the body, special construction has been used at one of the cross-ties. The cross-tie sheet is extended vertically above the slope sheet adjoining the door, thus permitting the adjoining hopper sheet to be placed at the proper angle for complete clearing.

The slope sheets are stiffened between the body bolster and the end of the car by 3-in. 6.7-lb. Z-bars supported on 3-in. x 3-in. x ¼-in. angles. The hopper doors are of pressed construction made by the Union Metal Products Co. and are formed so as to overlap the hopper sheets and also to provide an increase in the cubic capacity of the



THIS light-weight hopper car is equipped with variable braking to compensate for the variation in the momentum of the car when empty and when loaded.

body. The doors are secured by Wine hopper door locks.

In general, the body is of riveted construction. However, a small amount of fusion welding has been used for joining members around the cross ridges. The body rivets which come in contact with the load are Cor-ten and all others low-carbon steel. The bolster center filler is very similar to that designed for the new A.A.R. hopper cars. The total weight of the body is 21,260 lb.

To provide adequate braking for the loaded car on heavy grades and to reduce the variation in the weight of retardation on the car when loaded and empty, these cars have been equipped with empty and load brakes, having two brake cylinders. The braking ratio is 60 per cent on the light car and 30 per cent when the car is fully loaded.

The light-weight trucks have side frames of the integral journal box type with a wheel base of 5 ft. 6 in. The truck bolsters have integral center plates and are designed for the new center plate height of 25¾ in. The weight of both the side-frames and bolsters has been reduced by the use of high-tensile cast steel. The wheels are the one-wear type of rolled steel with non-standard axles. The brake beams are A.A.R. No. 3 capacity of high-tensile steel with heat-treated cast steel brake-heads. Creco four-point brake beam supports are applied to all brakes. One Cardwell snubber is applied with each group of A.A.R. type D truck springs.

Principal Dimensions of Chesapeake & Ohio Light Weight Hopper Car

Length over striking plates	34 ft. 5¾ in.
Length inside	33 ft. 6 in.
Width inside	10 ft. 4 in.
Width overall	10 ft. 5 in.
Height, rail to top of sides	10 ft. 8 in.
Distance between truck centers	24 ft. 6 in.
Truck journals	5½ in. by 10 in.
Truck wheel base	5 ft. 6 in.
Light weight	34,600 lb.
Car body	21,260 lb.
Trucks	13,340 lb.
Load limit	134,400 lb.
Capacity, level full	2,258 cu. ft.
Capacity, 10-in. heap	2,525 cu. ft.
Ratio capacity pay load to gross weight	79.5 per cent

Automotive Fan & Bearing Co. of Jackson, Mich., manufacturer of automotive fans and mufflers, industrial fans, aircraft wheels and brakes, has been reorganized, and is now Hayes Industries, Inc. All of the assets, patent rights and good will have been taken over by the new company.

C. B. Hayes, the new president and general manager, was formerly head of the Hayes Wheel Co. and is a director of the Kelsey-Hayes Wheel Co. Charles Hollerith remains as vice-president and director of engineering. E. C. Hetherwick is secretary-treasurer, he also being formerly connected with the Hayes Wheel Co. as auditor.

The above three, with John W. Miner and Don T. McKone, make up the new directorate.

Light-Weight Box Car Has Welded High-Tensile Steel Body

WELDING and light materials have been used to reduce the weight of a 50-ton box car which was exhibited by the Pullman-Standard Car Mfg. Co. during the annual meeting of the Mechanical Division of the Association of American Railroads at Chicago June 26 and 27. The body is of welded Cor-ten steel construction and the trucks are likewise of light-weight design, the truck side frames and bolsters being made of manganese-vanadium, double-normalized steel castings.

The new car weighs 10,200 lb. less than the Chicago Great Western standard car, built about a year ago, and 11,800 lb. less than a former conventional steel double-sheathed box car. The saving in dead weight is, of course, available for increased load-carrying capacity. Cubic capacity has been increased by providing 2 5/16 in. greater inside width with the same outside dimensions.

The marked saving in dead weight has been effected without increase in cost over conventional steel construction.

How the addition of columbium to austenitic stainless steel results in the elimination of intergranular corrosion is outlined in a pamphlet on "Stainless Steels Treated with Columbium," issued by the Electro Metallurgical Co., 30 East Forty-second Street, New York. Data are also given on the physical properties and corrosion resistance. When welded with columbium - treated welding rods, these steels are said to exhibit no susceptibility to grain-boundary deterioration in the "as welded" condition. Full corrosion resistance is obtained without heat-treatment after welding.

NEW CAR COMPARED WITH CARBON STEEL CARS

	Pullman-Standard Cor-Ten Steel Box Car	Chicago Great Western A.A.R. Standard Box Car	Former Conventional Steel-Sheathed Box Car
Inside length	40 ft. 6 1/16 in.	40 ft. 6 in.	40 ft. 6 in.
Inside width	8 ft. 11 5/16 in.	8 ft. 9 in.	8 ft. 9¼ in.
Inside height	9 ft. 4 1/8 in.	9 ft. 4 in.	8 ft. 7⅝ in.
Cubic capacity	3,384 cu. ft.	3,311 cu.ft.	3,056 cu. ft.
Load limit	134,800 lb.	124,600 lb.	123,000 lb.
Body weight	20,240 lb.	28,560 lb.	.....
Truck weight	13,960 lb.	15,840 lb.	.....
Total light weight	34,200 lb.	44,400 lb.	46,000 lb.
Maximum rail load	169,000 lb.	169,000 lb.	169,000 lb.
Ratio A.A.R. load limit to maximum rail load	79.8 per cent	73.7 per cent	72.8 per cent

The Growler Becomes Respectable

Beer Cans Open Up New Outlet for Tin Plate

By GEORGE EHRNSTROM, JR.
Resident Pittsburgh Editor, The Iron Age

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THE latest scion of the old, disreputable "growler" is beginning to amaze the public by its neat, refined appearance. Although permitted to the public gaze in only a few selected consuming areas since its recent birth, the new container for beer and ale evidently is winning genuine approval and bids fair to erase the rather unfavorable recollection of its "family entrance" ancestor. Its reception in certain areas, where severe sales resistance has been overcome, has strengthened the belief that it will win an important percentage of the national trade now served with bottles.

The grooming of the new container, however, is purposely deliberate. First, the public must be educated to a radical departure from long accepted methods of malt beverage distribution. Second, the tests in certain "proving grounds" must show that the new article will bear "repeat" trade strictly on its merits and will outlive its novelty feature.

Not a small part has been and will be played by the tin plate industry, which obviously has a great deal to gain through this new development, in the early experiments and distribution. The American Sheet & Tin Plate Co., Pittsburgh, already has developed especially for the purpose an unusually stiff, ductile tin plate. After many experiments, it has been found that 107-lb. stock is thus far the most suitable for beer can manufacture.

Can Holds 12 Fluid Ounces

The new beverage can, as illustrated, measures 4 13/16 in. high and 2 11/16 in. in diameter. The volume of content is 12 fluid oz., or the same volume contained in beer and ale bottles. This can is lined with a special, clear lacquer that is said to prevent any undesirable chemicalization. A special can opener, which is illustrated with the can, has been designed by a leading container manufacturer and is now being distributed in the market areas selected for the tests. This opener hooks under the rim at the top of the can and punches out a triangular section of the cover with a quick, upward movement. The first beer and ale cans that have appeared in the selected markets are colorfully and tastefully lithographed.

A survey of the potential distribution of canned malt beverages and the attendant increased demand for tin plate can not accurately be presented. The only key to the potential limit lies in the reported enthusiastic reception at Richmond, Va., and in certain areas in the Tri-State district, which were selected to test public acceptance. Further indications may be provided only by reviewing a few broad angles.

The saving in volume in the can over the bottle is said to be 65 per cent; the saving in weight 55 per cent. Obviously, the can represents a great medium, to the beverage distributor, for reducing transportation costs not only in shipment of the filled container but also in sparing the shipper the freight on return movement of "empties," as is necessary in shipping bottled beer and ale.

Loss through breakage in shipping cans would be practically nil. Greater storage of canned beer and ale also is possible, not only for rail shipment but also for storing in breweries and distributing warehouses. Great economy also is possible through the use of cans in that stocks of empty bottles, which usually are carried in great quantities by large breweries during the winter, or "off" beer season, would be greatly reduced, or possibly unnecessary.

Quick Pasteurization Improves Flavor

The advantages claimed for the canned beer and ale for the consumer chiefly are its favorable flavor, made possible by unusually quick pasteurization before canning; its ease of handling, and facility of chill.

But, despite the claimed advantages for the canned beverage over the bottled product, conservative observers in the tin plate industry are not making any foolhardy predictions as to the immediate benefits in tin plate demand. A great deal of work remains before a measurable increase in tin plate consumption from this new source will materialize. Heavy capital expenditures necessary by can manufacturers and also by brewers for new equipment may hinder rapid development. Many small brewers have not yet recovered from heavy capital outlays for rehabilitating their establishments immediately after the repeal of the Volstead

Act. It may now be significant that only brewers with facilities for national distribution have thus far been actively associated with canned beer and ale.

In the Pittsburgh area a brewer is considering the installation of canning equipment that would cost approximately $40,000; the completed job would require about 12 weeks. At that rate, broad changeovers or equipping for canning beer would not place any great number of brewers in position to meet the peak beer and ale demand of summer months with the new canned product. Moreover, the installation of canning equipment in smal breweries with only local distribution would depend primariy upon the availability of funds.

It is impossible at this point in the development to attach any significance to the current ratio of tin plate demand to the total consumption of beer in bottles. Only the surface of potential tin plate demand thus far has been scratched. Estimates of the ultimate increase growing out of the marketing of canned beer and ale are rife. The most conservative figures cover only 100,000 tons of tin plate annually, or 2,000,000 base boxes. Based on last year's output, these figures represent only about 3⅓ per cent of the total tin plate produced in this country last year. More enthusiastic exponents believe a prediction of an increased yearly demand, when the development matures, of 6,000,000 base boxes, or 300,000 tons, is fully justified.

All estimates naturally hinge upon the public thirst and acceptance, which, as they relate to beverages, usually are subject to violent fluctuation. But the tin plate industry is assured of at least a substantial outlet for its product if the early success of the canned beverage is augural of the future behavior of wider markets when national distribution is made possible. In the meantime, the increasing distribution of canned malt beverages probably will find a proportionate resistance from the bottle industry, which can not be expected to view the new development apathetically. Not beyond the realm of possibility also is the introduction of a container produced from aluminum, which has met with success in the handling of beer in larger quantities.

Apprentice Training Needed to Supply Skilled Labor Shortage in Industry

A COMPREHENSIVE and efficient system of apprenticeship training is necessary to supply the lack of skilled labor now facing certain lines of industry, according to the findings of a survey just completed by the National Industrial Conference Board.

In this survey, 287 metal manufacturing companies located in 21 States reported that the total number of craftsmen needed at once and not now available was 1193, or 1.04 per cent of their aggregate employment. With industries operating at normal capacity, the board estimated that there would be a shortage of about 120,000 skilled workers.

Apprentice training of the future must be something more than has been attempted on any wide scale in the past, in the view of those who participated in the board's survey. The duty and responsibility of training skilled labor must no longer be assumed only by the larger and public-spirited companies. Each unit must do its share. Small companies should collaborate with other small companies and with their trade associations or the state, but under a program fair to all and comprehensive in its scope. Further, apprenticeship must be made more attractive in order to draw the type of youth who can best profit from the training and in many cases become potential management material.

Better cooperation with trade schools and vocational courses in public schools is urged. Some vocational work attempted in schools has failed to win industry's respect, but there are cases in which excellent work has been done in the way of preliminary instruction and development of aptitudes and leanings. Industry's cooperation will help to improve and expand this work and make it of greater practical value to both employer and employee. Public school cooperation in the teaching of theory can be made a valuable adjunct to apprenticeship courses, as has been found in Wisconsin.

Trade associations and local employers' associations can serve a helpful purpose in coordinating and integrating apprentice training in the plants of member companies, as well as by urging on all companies the need of undertaking their share of the training effort. Adoption of uniform standards in the matter of hours of shop work and study, time to be spent in the various stages of training, rates of pay, and attainments to be required for a certificate, together with adequate supervision over the training program, can help materially to assure the usefulness to industry of the product of these courses.

Wisconsin Practice Successful

While industrial executives tend to resent the participation of Federal or State Government in their affairs, it is significant that employers in Wisconsin, the State that pioneered in enacting an apprenticeship law, speak highly of the results of this law and commend such a system to those in other States. This law was enacted in 1911, largely at the instance of employers, and for more than 20 years has made possible an orderly and systematic training of apprentices.

Under this law, the industrial commission of the State is charged with the administration of the law and supervision over all apprentice training. The commission must approve all work programs for apprentices. It issues rules and regulations for carrying out the provisions of the law. It must approve indentures. It adjusts grievances between apprentices and employers with regard to fulfillment of the provisions of the indenture, and it issues certificates of graduation. It is assisted by committees made up of equal numbers of employers and representatives of the mechanics. The industrial commission and employers in the State have worked together closely and harmoniously in bringing about a high standard of training and achievement.

Uncertainty about the future of business tends to discourage the active preparation for future demands which industrial management would normally make, and yet if such preparation is deferred, it will be at the risk of handicapping industry's ability to respond to more active demand when it comes.

Improvements in Production

Automatic Lathe Equipped for Machining Oil Well Drilling Tool Part

By ROGERS A. FISKE
Western Editor, The Iron Age

OCCASIONALLY almost every machine tool builder encounters seemingly simple production tooling problems which do not yield to ordinary methods of treatment. Such jobs become known in shop engineering departments as "tough nuts" and extraordinary measures must be employed. One job of this type is illustrated in Fig. 1. It is a forging for the bridge or cross piece of a tool used in drilling oil wells. The forgings come in three different sizes which may have the central hole in several slightly varied positions. Included angle between the two arms on the forgings is 120 deg. Three diameters on each arm must be turned accurately and flat surfaces, at right angles to each arm, faced smoothly. Material is special steel difficult of clean machining unless unusually rigid means are provided for holding and all conditions are made favorable. Work is complicated further by the fact that both arms of each forging must be machined at one chucking; and roughing and finishing must be completed successively on each arm.

In order that one arm may be rough-turned and then finish-turned before the second arm is swung into position engineers of the Sundstrand Machine Tool Co., Rockford, Ill., have designed the specially equipped 15-in. automatic stub lathe shown in Fig. 3. As a foundation for the job, the machine was equipped with a spindle having a heavy integral flange equal in diameter to the outside of the chuck.

There was also provided a square tool block or turret on the front carriage. This carries roughing tools on one side and finishing tools on the opposite side. On the rear slide a heavy tool block, mounted for vertical movement, carries a finish-facing tool and a finish-forming tool above one rough-facing tool. The tool block is actuated by a pneumatic cylinder. The control valves for the cylinder are located on the front slide as shown by *V-V*

FIG. 1

FIG. 2

o o o

THE arm forgings, illustrated above in rough and finished condition, are conveniently machined, in a range of three sizes, on a specially equipped stub lathe, shown at right, employing a pneumatically-operated tool block. Both arms are machined at one chucking. The cycle of operations involves the completion of roughing and finishing cuts successively.

o o o

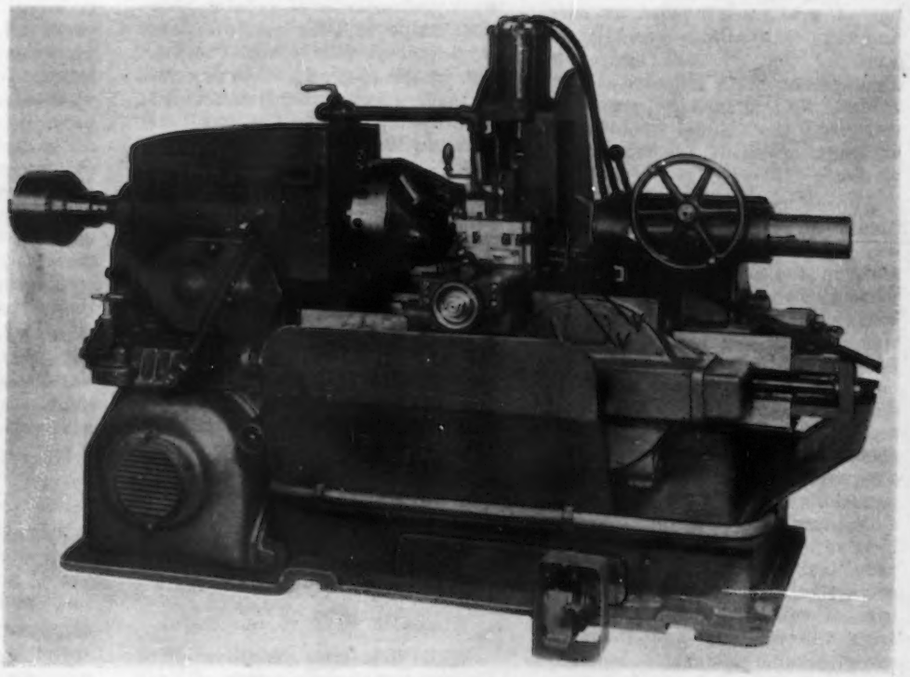


FIG. 3

and Shop Equipment . . .

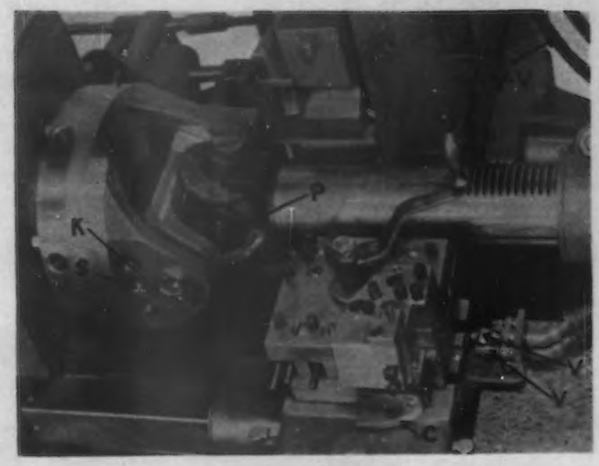
in Fig. 4. These valves are actuated by cam *C* and a similar cam on the opposite side of the square tool block. The roughing tools on front and rear slides are shown in Fig. 4. When the tool block or turret on the front slide is indexed to bring the finishing tools into position, cam *C* actuates lower valve *V* which causes the pneumatic cylinder on the rear slide to move the tool block downward thus moving the rough-facing tool out of the way and bringing the finish-facing tool and the forming tool into cutting position.

Three chucks were provided to handle the different sized forgings. Each chuck has two heavy arms which support a cradle or yoke in which the work-piece is mounted by slipping the reamed hole in the forging over a stud on one side of the cradle. The work-piece is then clamped tightly in position by means of pad *P* (Fig. 4) which is actuated by a quick acting interrupted thread, which is moved by knob *K*. The tailstock is then advanced to center the forging so that equal amounts of metal will be removed from both arms. The operator then clamps the piece accurately in position, using a wrench, in hole *S*, on the chuck clamp screw. The tail spindle is drawn back and the cradle rotated to bring one arm in position for turning. A pneumatic cylinder actuates a heavy bolt which locks the cradle in position.

Rough turning proceeds on the front slide and rough facing on the back slide. At the end of the cut both slides return to starting position. The operator then indexes the front tool block to bring a second set of tools into position for finish turning three diameters and shaving a bearing diameter. When the front tool block is indexed from roughing to finishing position it automatically actuates the pneumatic cylinder on the rear slide; this moves the rear tool block downward thereby carrying the roughing tool out of the way and presenting two finishing tools to the work. After one arm is rough and finished turned, the operator indexes the front tool block to bring the roughing tools back to turning position. He then operates a foot control valve to unlock the work-holding cradle, swings the workpiece to second position and again operates the foot control valve to lock the cradle in second position. The automatic cycles of rough and finish turning then repeat.

FIG. 4

TAIL spindle of special stub lathe in advanced position, for centering, during the chucking operation. After withdrawal of the tail spindle the work-holding cradle is rotated to bring the forged arms into machining position.

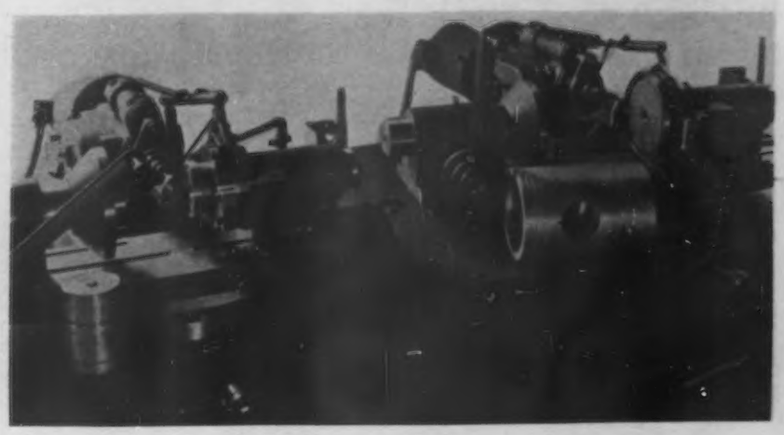


Ample power, rigid support for suitable high-speed steel and cemented carbide tipped tools, and the rigid chuck mounting on the full-diameter integral flange of the spindle, all combine to provide well finished work turned at high speeds and feeds. The quick-acting work clamp, foot-controlled cradle-lock, synchronized shift of rear tools, and automatic cycle of the machine, cut work handling and operating time to a minimum.

Drilling Equipment for Piston Smoke Holes

A NEW type of smoke hole drilling machine for passenger car, truck and Diesel pistons has been developed by Millholland Sales and Machine Co., Indianapolis, Ind. Two No. 2 Millholland drilling units with ½ hp. motors, automatically drill the holes and actuate the ratchet index fixtures as illustrated in set-up. After required number of holes have been drilled, feed is automatically disengaged.

Fixtures are mounted on swivel



bases to accommodate varying degrees of angularity of smoke holes common to different styles of pistons. Adjustment for length and size permits drilling the small passenger car piston or the 8-in. Diesel pistons 11 in. long. Change of ratchet plates and drilling cams provide for any number of holes and for any drilling depth.

On large pistons, each unit will drill 12 holes 1¼ in. deep in 2¼ min. Smaller pistons are drilled in proportionately faster time.

Ball bearings are used on motor shafts, drill spindle, and on index fixture spindle. Quick clamping fixture locks are provided. Coolant for drills is supplied by motor driven pump.

Tunnel-Type Broaching Machine On Cylinder Block Operations

TO broach the eight locating spots on the top of the cylinder block of a V-eight motor, the American Broach & Machine Co., Ann Arbor, Mich., has designed and built an automatic cylinder block broaching machine of the tunnel type. The surfaces to be broached are about 1⅛ in. sq., four being on each side of the V-block. Broaching is the initial machining operation on the casting.

The machine consists of two cylinders operating in slides above the position at which the work is broached. These cylinders are locked together by means of a crosshead which is held by a large key and is rigidly bolted to pads extending from the cylinder through an opening in the upper frame thus tying both cylinders together and providing for movement as a unit. The cylinders are arranged with integral guides, a standard construction on American broaching machines. Over the slide of the cylinder are heavy circular-type caps which are keyed to the upper frame for alinement. These also serve as guiding surfaces for the upper part of the cylinder ways, and as rigid ties for the upper members.

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TUNNEL-TYPE broaching machine for broaching locating spots on top of a V-8 cylinder block is shown at right, below, and at top of opposite page. The illustration below is of the loading end.

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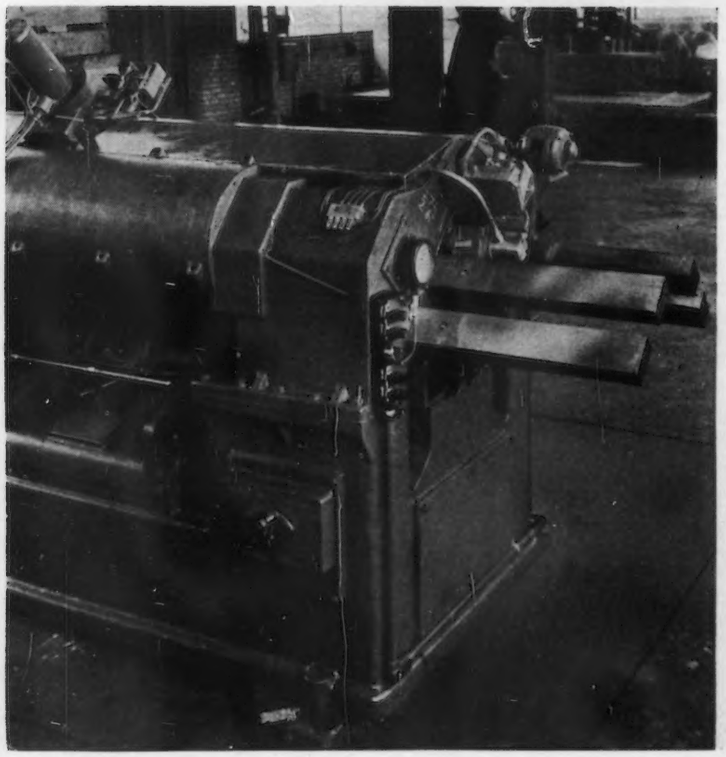
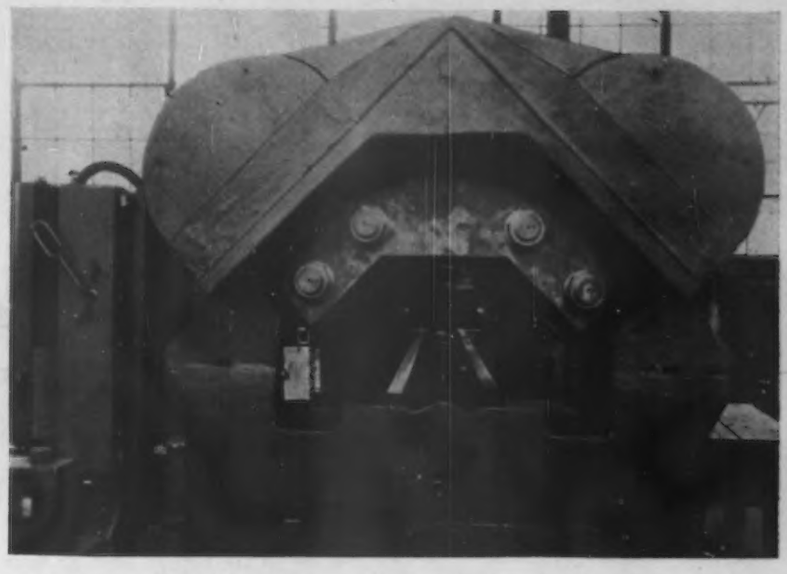


There are three main sections of the machine, the base and two upper members which form a tunnel shape. The latter are built on a 45-deg. angle and are keyed and bolted together. Each one has two slides, with hardened and ground liners and caps, and fitted with hardened and ground tool-steel broach carriers. These carriers are about 90 in. long. In them the broach holder and broach are mounted, the former having a taper adjusting wedge for adjusting the broaches. The broaches are held in the broach holder by means of round, hardened plugs having flat tapered sides, each plug being held in position by a screw. This arrangement provides positive and quick means for clamping or removing the broach or broach holder.

In the center of the inside of the vee, which forms the tunnel shape of the machine, is mounted a small hydraulic cylinder to which is at-

tached a swinging arm that brings the cylinder block into the machine and into the fixture position. The fixture, by hydraulic means, automatically centers the block and lifts it up against locators which fit inside four bores, one at each end at each side of the block. The main pulling rams immediately start the cutting stroke, allowing the broaches to pass over the cylinder. Upon completion of the cut, the fixture releases, lowering the block and permitting the broaches to pass back on the return stroke. When the return stroke is finished, the machining cycle is repeated and the cylinder block already broached passes down through the tunnel and keeps moving as additional blocks are broached until it passes completely out of the machine. The time of the broaching cycle is 24 sec. per block.

The base of the machine serves as an oil reservoir, with a capacity of 60 gal. The various hydraulic valves and solenoid controls are placed in the middle section of the column and are easily accessible through a panel on the back of the machine. There are two main cylinder pressure pumps, both of which are directly driven from motors mounted on the rear of the machine. The machine is equipped with a high pressure lubricating system, push button control and variable speed control to the hydraulically-operated cylinders.



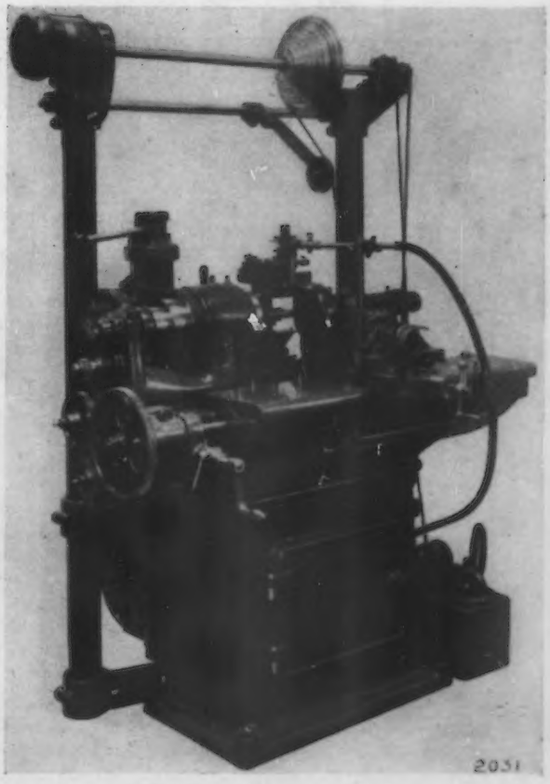
THIS view, opposite the loading end of the broaching machine, shows the manner of tying the cylinders together, providing both rigidity and unit travel.

Cylinder blocks are brought up to the machine by roller conveyor at a height to be received by the machine. The same type of machine can be arranged to broach other cylinder block surfaces.

New Toolroom Thread Grinding Machine

BELOW is illustrated a new, motor driven, toolroom type thread grinding machine for finish grinding high precision screw threads, for external and internal gages and taps, and hardened production thread parts. The equipment is built by Société Genevoise D'Instruments de Physique and is sold in the United States by Triplex Machine Tool Corpn., 125 Barclay Street. New York.

A 2-hp. motor is mounted at the rear of the bed with the drive extending to a backshaft and to a cone pulley on the machine. This arrangement gives six work-head speeds. Eight spindle speeds are obtained through a grooved pulley on an overhead shaft.



A master leadscrew, protected from grinding dust and dirt, is said to make possible the obtaining of an accuracy of leadscrews to plus or minus 0.0001 in. A correcting device is provided. Suitable water pump and piping is provided for wet grinding. A diamond truing device, capable of a wide range of thread angles, is standard equipment.

A vertical microscope is fitted over the top of the wheel providing a means for controlling the profile angle of the wheel and of the workpiece during the grinding process. The grinding wheel can be tilted to any suitable angle of helix formed by the threads to be ground. Male threads, from 3/16 to 6 in. diameter, and up to 12 in. in length, are ground between centers, the work being driven by dogs. For female threads, the grinding capacity is from 1¼ in. to 5 in. inside diameter.

A temperature corrector is furnished to take care of variations from 32 deg. to 68 deg.

Pratt & Whitney Co., Hartford, Conn., has sold its foundry on Flower, Queen and Beach streets to Suisman & Blumenthal, Inc., metal dealers. Approximately 120,000 sq. ft. of land are involved. What the new owners propose to do with the property has not been announced.

Toledo Punch Presses Being Streamlined and Strengthened

CONSIDERABLE effort is being made by the Toledo Machine & Tool Co., Toledo, Ohio, to smooth out the lines of its presses and eliminate corners and dust pockets wherever possible. While this necessarily improves the appearance of the equipment there is back of it a carefully worked-out plan for increasing the strength of sections, for distribution of the metal in the most efficient manner and elimination of any possible strain lines by the use of ample radii. The No. 97 twin-driven press here shown is one of the latest designs, and is an extremely compact and rugged machine.

Frame members are high-test alloy castings of exceptional tensile strength and surface hardness. A high modulus of elasticity obtained in these alloy castings makes possible much greater stiffness of bed and slide members than has been practical in the past. Shrunk steel rods are designed to protect the press from overloading on the heavy bottoming operations for which it is employed. The press is equipped with mechanically controlled self-adjusting pneumatic friction clutch. The rapid action of this clutch permits a considerable increase in production rate over the former clutches. The equipment also includes pneumatic counterbalance cylinders, cross-bar knockout in slide and direct connected liftout in the bed.

Electric Resistance Heating Machine

TAPERED studs made from screw machine stock are heated electrically at the rate of 1000 an hour by the machine illustrated below, which has been built by the Taylor-Winfied Corpn., Warren, Ohio. The actual current dwell for heating of two pieces simultaneously is less than 3 sec. The heated studs are subsequently hot formed in a press.

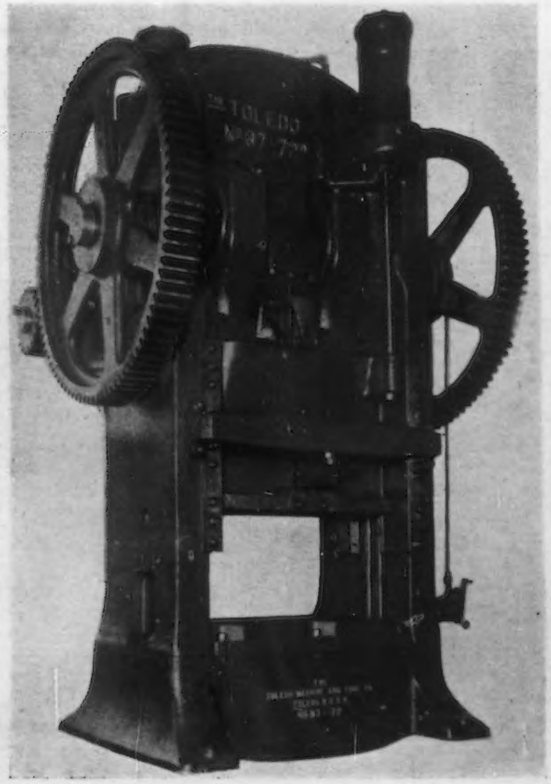
In principle and construction the machine follows the general arrangement of the company's spot or projection welders. Base and other parts of the frame are made of welded steel, and the base houses a 75 kva. transformer.

Except for feeding of the studs by hand into the indexing fixture, operation of the machine is entirely automatic. The dial mechanism is operated by a small motor through a gear reduction, moving the dial from station to station at a speed convenient for loading. The upper electrodes are brought to bear on the studs by means of an air cylinder operated from the dial indexing mechanism, all movements being synchronized so that no attention from the operator is necessary. After the studs are heated to a predetermined temperature, they are ejected by air cylinder into an inclined chute which carries them to the press for the hot forming operation. The length of current dwell is governed by an electronic "time" timer.

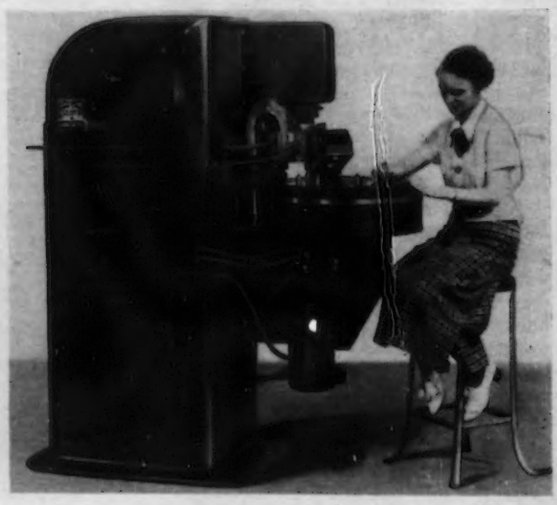
Similar equipment can be furnished for a multitude of heating operations, both large and small, and for practically any shape of material.

New Grinder Adapted To Carbide Tool Work

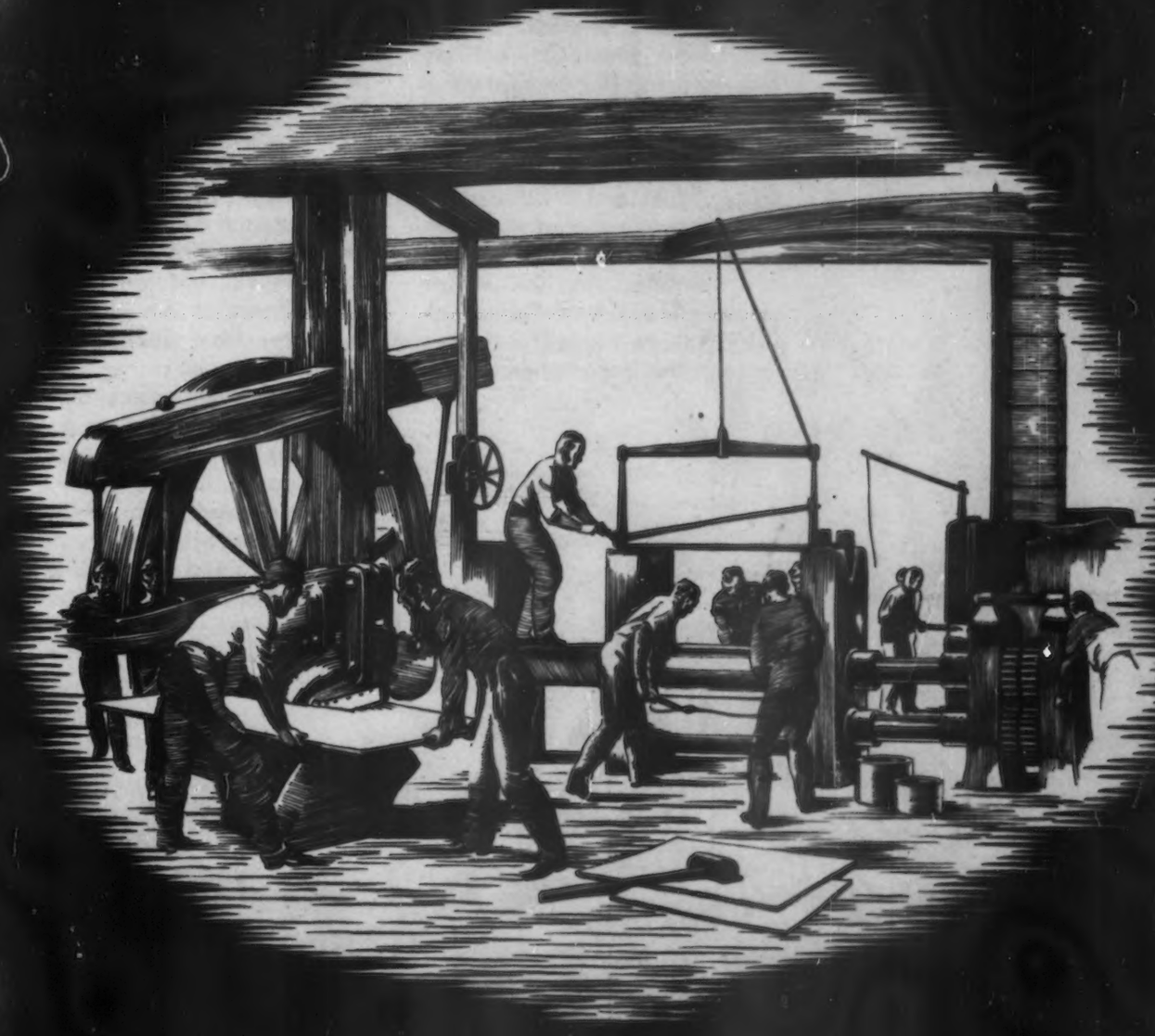
STOKERUNIT CORPN., Milwaukee, is marketing a simple grinding and lapping machine said to be suitable for the maintenance of various types of carbide tools. Two tables are provided, each adjustable in relation to the face of the wheel and for angular settings. A protractor, interchangeable between the two tables, permits grinding and lapping with the same setting. The lapping disk is of high-grade cast iron, utilizing diamond dust and oil. The pump, easily disconnected, is operated by a separate motor.



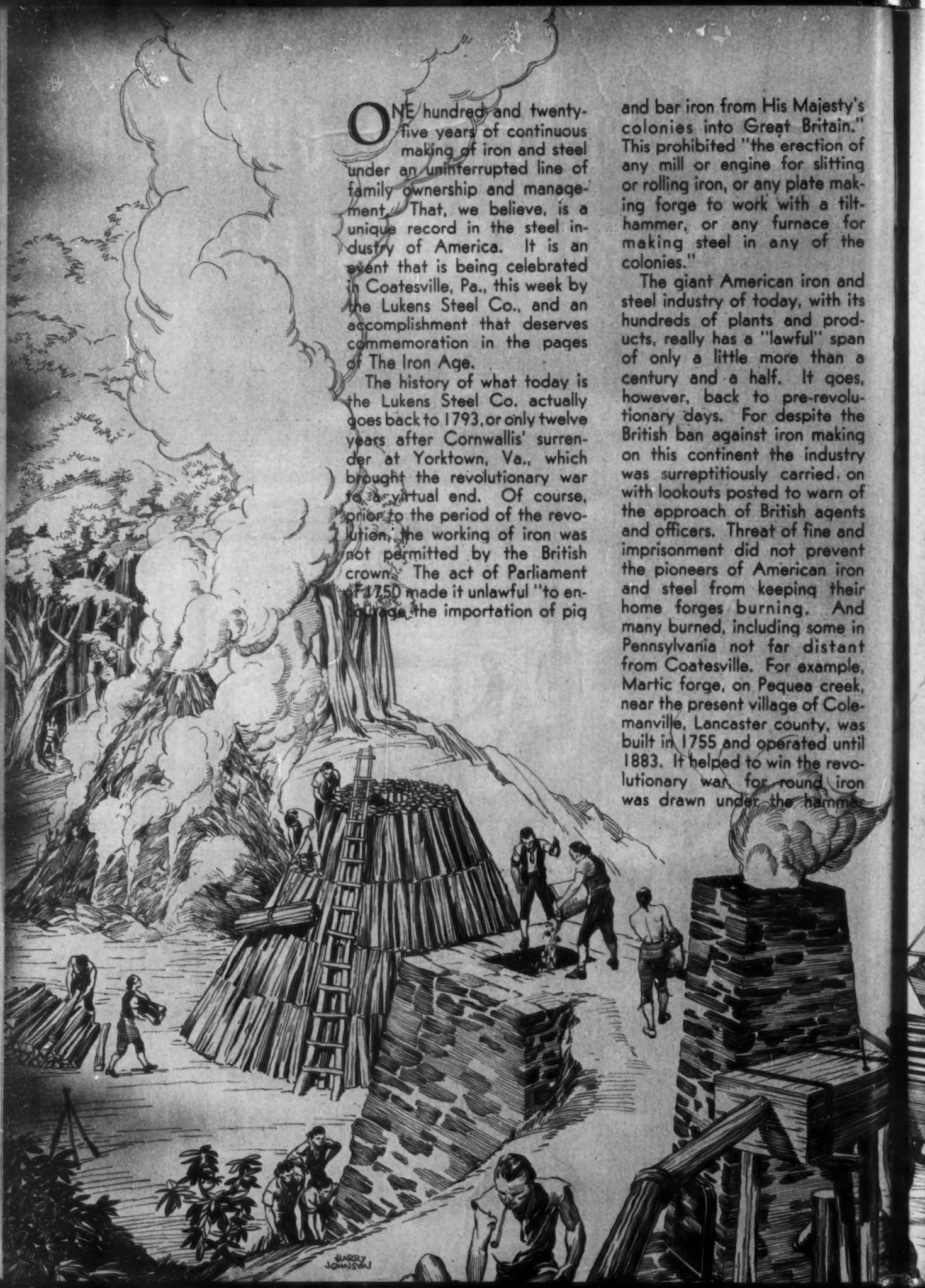
STUDS are heated electrically at the rate of 1000 per hour on the machine, at lower right, which is described above.



A CENTURY AND A QUARTER IN IRON AND STEEL



THE "Old Mill," built on Brandywine Creek in 1810, has grown into the present Lukens Steel Co.



ONE hundred and twenty-five years of continuous making of iron and steel under an uninterrupted line of family ownership and management. That, we believe, is a unique record in the steel industry of America. It is an event that is being celebrated in Coatesville, Pa., this week by the Lukens Steel Co., and an accomplishment that deserves commemoration in the pages of The Iron Age.

The history of what today is the Lukens Steel Co. actually goes back to 1793, or only twelve years after Cornwallis' surrender at Yorktown, Va., which brought the revolutionary war to a virtual end. Of course, prior to the period of the revolution, the working of iron was not permitted by the British crown. The act of Parliament of 1750 made it unlawful "to encourage the importation of pig and bar iron from His Majesty's colonies into Great Britain." This prohibited "the erection of any mill or engine for slitting or rolling iron, or any plate making forge to work with a tilt-hammer, or any furnace for making steel in any of the colonies."

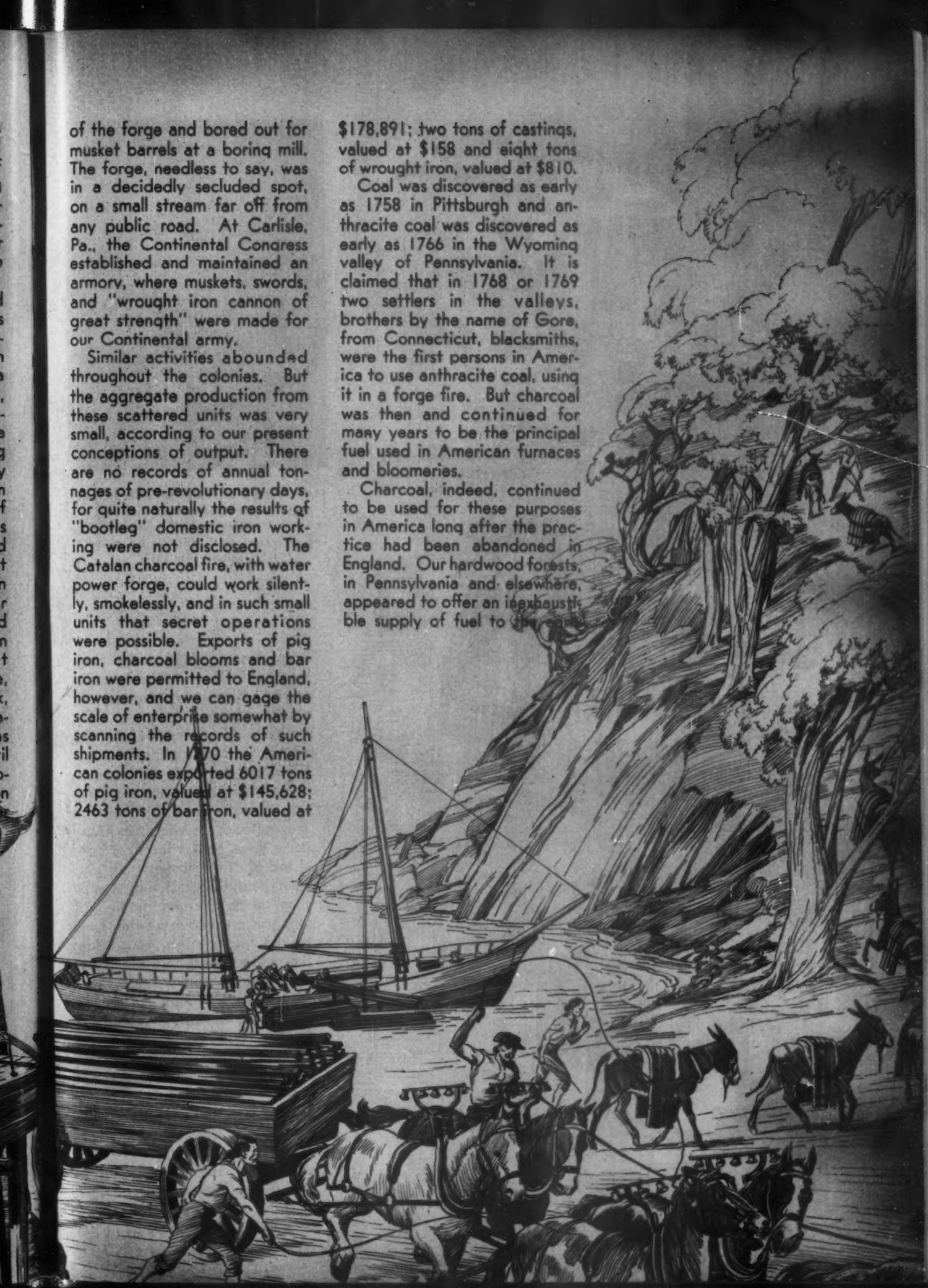
The giant American iron and steel industry of today, with its hundreds of plants and products, really has a "lawful" span of only a little more than a century and a half. It goes, however, back to pre-revolutionary days. For despite the British ban against iron making on this continent the industry was surreptitiously carried on with lookouts posted to warn of the approach of British agents and officers. Threat of fine and imprisonment did not prevent the pioneers of American iron and steel from keeping their home forges burning. And many burned, including some in Pennsylvania not far distant from Coatesville. For example, Martic forge, on Pequea creek, near the present village of Colemanville, Lancaster county, was built in 1755 and operated until 1883. It helped to win the revolutionary war for round iron was drawn under the hammer

of the forge and bored out for musket barrels at a boring mill. The forge, needless to say, was in a decidedly secluded spot, on a small stream far off from any public road. At Carlisle, Pa., the Continental Congress established and maintained an armory, where muskets, swords, and "wrought iron cannon of great strength" were made for our Continental army.

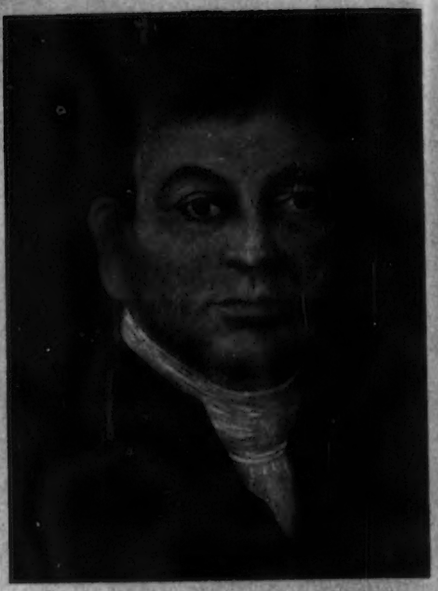
Similar activities abounded throughout the colonies. But the aggregate production from these scattered units was very small, according to our present conceptions of output. There are no records of annual tonnages of pre-revolutionary days, for quite naturally the results of "bootleg" domestic iron working were not disclosed. The Catalan charcoal fire, with water power forge, could work silently, smokelessly, and in such small units that secret operations were possible. Exports of pig iron, charcoal blooms and bar iron were permitted to England, however, and we can gage the scale of enterprise somewhat by scanning the records of such shipments. In 1770 the American colonies exported 6017 tons of pig iron, valued at $145,628; 2463 tons of bar iron, valued at $178,891; two tons of castings, valued at $158 and eight tons of wrought iron, valued at $810.

Coal was discovered as early as 1758 in Pittsburgh and anthracite coal was discovered as early as 1766 in the Wyoming valley of Pennsylvania. It is claimed that in 1768 or 1769 two settlers in the valleys, brothers by the name of Gore, from Connecticut, blacksmiths, were the first persons in America to use anthracite coal, using it in a forge fire. But charcoal was then and continued for many years to be the principal fuel used in American furnaces and bloomeries.

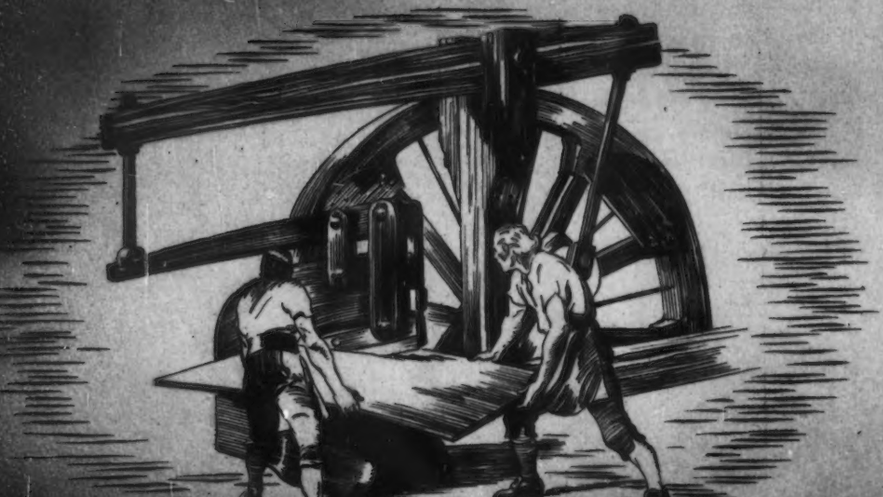
Charcoal, indeed, continued to be used for these purposes in America long after the practice had been abandoned in England. Our hardwood forests, in Pennsylvania and elsewhere, appeared to offer an inexhaustible supply of fuel to the



Tilt hammer at work on charcoal iron plate.



ISAAC PENNOCK, founder of Lukens Steel Co., began the production of iron at Rokeby, Pa., in 1793. He established "Brandywine Mill" on site of present plant in 1810, and served as proprietor until 1817.



Rods were slit on crude "walking beam" shears.

Nails were formed on simple hand-operated machines.

iron masters, long after England's woods had been brought to the point of depletion by the charcoal burner's axe.

While we are sketching the background of the times which witnessed the entry of the founder of the present Lukens Steel Co., it may be well to outline the methods in vogue in those early days. Blast furnaces consisted of crude stone structures, usually built against a hillside so that mules or men, in lieu of skip hoists, could make their way to the furnace top, to charge. Bloomeries were no more nor less than Catalan forges. Both furnace and forge received their cold blasts via wood and leather bellows; in the more progressive works, operated by water wheel. Water indeed was the sole source of mechanical power in those pre-steam engine days, which accounts for the selection of streams as sites of these pioneer iron making and working establishments.

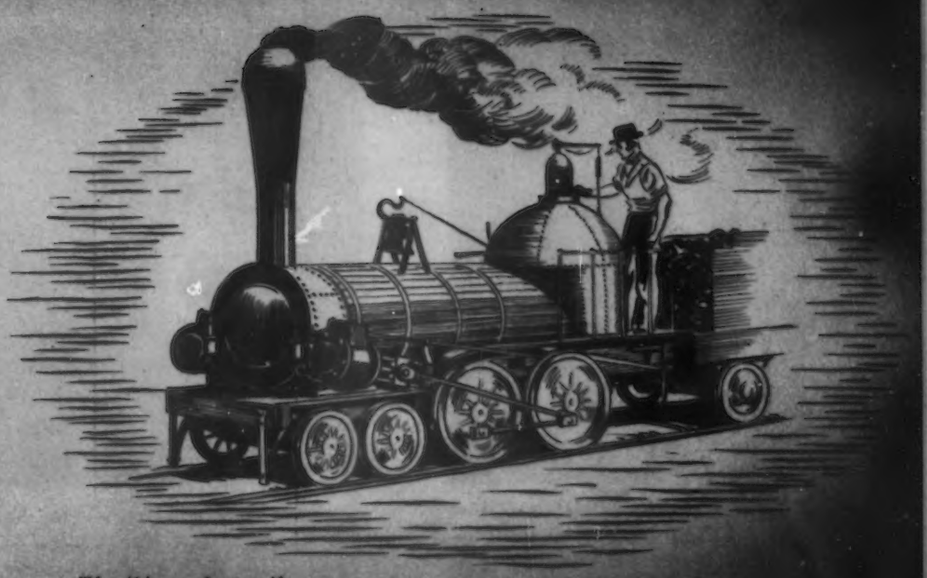
Plates were hammered from charcoal blooms by tilt-hammers

DR. CHARLES LUKENS, son-in-law of Isaac Pennock, became junior partner in 1813 and proprietor in 1817, carrying on the business until his death in 1825.

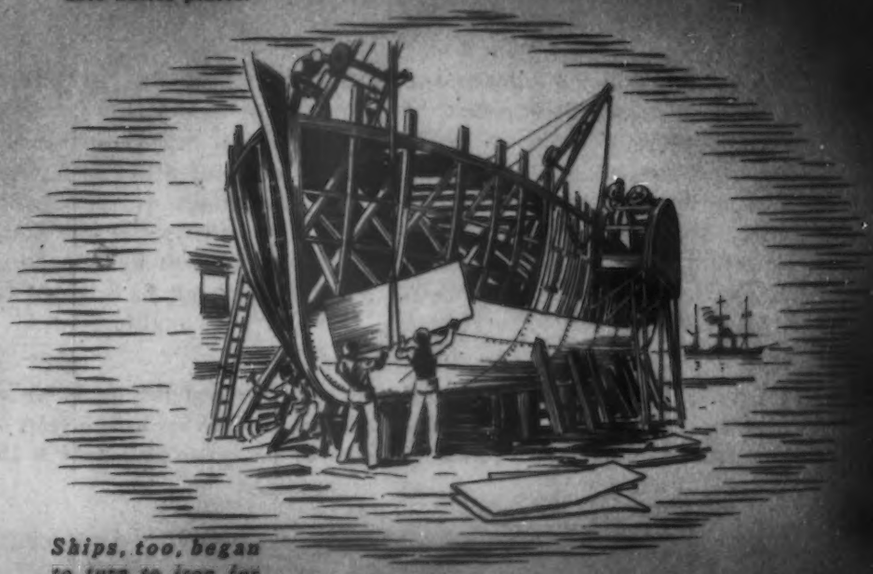
operated by water wheel power or by the more laborious process of hand sledging upon an anvil. Rods were sheared from crudely hammered plates by circular or "alligator" shears and then rounded by hand forging. Nail rods, for the old fashioned square nails, were made in similar fashion. Nails were headed by hand forging or by the use of the "nail making machine," a new invention in those days usually operated by a combination of hand and foot power.

Prior to 1816 all the rolling and slitting mills neither puddled pig iron nor rolled bar iron, but rolled only sheet iron and nail plates from blooms hammered under a tilt-hammer. Plain rolls were used. The sheet iron was used for various purposes, including the making of salt pans. In 1816 the first rolling mill erected in the United States to puddle iron and roll iron bars was built at Isaac Meason on Redstone creek, Fayette county, Pa.

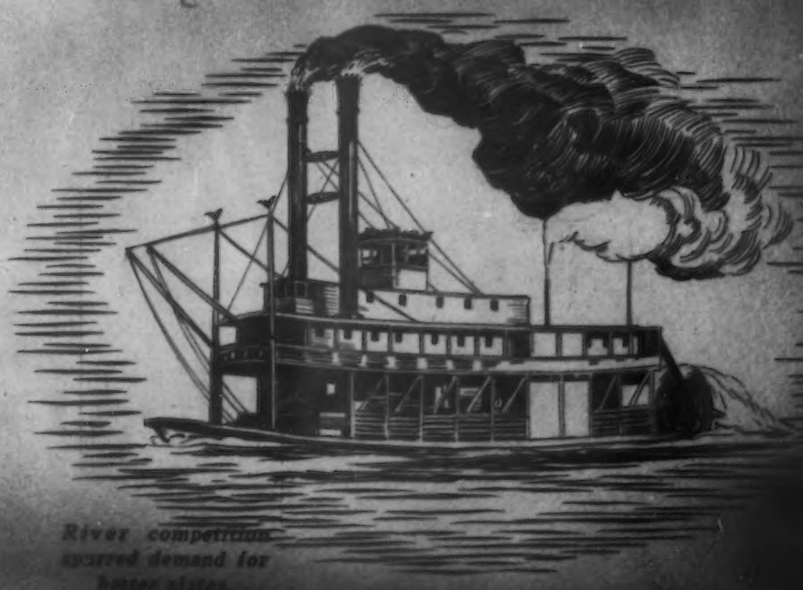
Delivery in those days was



The "iron horse" called for dependable boiler plates.



Ships, too, began to turn to iron for sheathing.



River competition spurred demand for better plates.

REBECCA LUKENS, wife of Dr. Charles Lukens, took over the business upon his death in 1825 and continued as its active head until 1847.

ABRAM GIBBONS, son-in-law of Rebecca Lukens, was engaged as superintendent in 1843, assumed active management of the business in 1847 and served until 1855 in that capacity.

DR. CHARLES HUSTON, son-in-law of Rebecca Lukens, became a junior partner in 1849, proprietor in 1855 and served as president from 1890 to 1897.

crude, tortuous and uncertain, and was made by parcels, a la horseback or by carts weaving through rough, mountainous paths or over rough dirt roads that were scarcely more than difficult trails.

The first delivery of the Bedford bar iron to Pittsburgh, made perhaps in 1793, reflects the general mode of transit in the iron and steel industry in the early days of the country.

"In the forge the pig iron of the furnace was hammered out into bars about six or eight feet long, and these were bent into the shape of the letter U and turned over the backs of horses and thus transported over the Alleghenies to Pittsburgh," the first part of the way by bridle paths. This pickapack delivery as a mode of rapid transit had

IN the group picture below and following upon the next two pages are shown 228 living employees of the Lukens Steel Co., each of whom has had 25 years or more of continuous service. The aggregate service of the group to Lukens is 7551 years.

CHARLES PENROSE, JR., served as junior partner to Dr. Charles Huston from 1859 to 1881.

A. F. HUSTON, son of Dr. Charles Huston, entered service as clerk in 1872; became junior partner in 1876; vice-president in 1890; president in 1897, and was chairman of the board from 1925 to 1930.

JOSEPH HUMPTON served as clerk from 1863 to 1890, and as treasurer from 1890 to 1925.

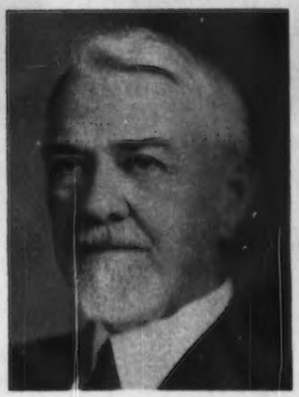
its counterpart in shipments by "arks."

For bar iron and castings from the Bedford furnace and other iron works in the Juniata valley were taken down the Juniata river in arks, many of them descending to as low a point as Middletown on the Susquehanna, whence the iron was hauled to Philadelphia. Much of the iron of the Juniata valley was also sent to Baltimore in arks down the Susquehanna river. Such were the conditions surrounding the making and taking to market of iron in America in the closing years of the 18th century.

The revolutionary war over, a free and independent America established under its own constitution, the first President having taken office in New York one year previously, there was great impetus to the iron trade. Isaac Pennock, young Quaker farmer, envisaged the market. It was his ambition to make iron. Friends and neighbors ridiculed the idea. Serious objection was made by the father, who strongly objected to his son "entering the hazardous iron business, particularly when wheat was selling at $3 a bushel and the influence

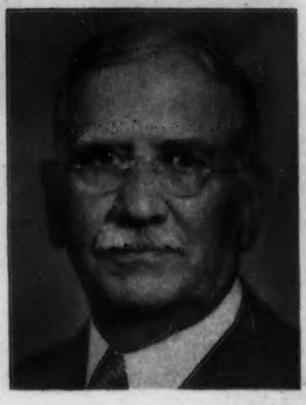
ROBERT W. WOLCOTT, son-in-law of A. F. Huston, has been president of the Lukens Steel Co. since 1925. After war service in naval aviation and several years of experience with Bethlehem Fabricators, Inc., he joined the Lukens company as manager of the New Orleans warehouse and fabricating department, serving in that capacity until his election to the presidency.

CHARLES L. HUSTON, first vice-president of Lukens Steel Co., is a son of Dr. Charles Huston. He entered the employ of the company as clerk in 1875; became partner in 1880; was vice-president and works manager from 1885 to 1925. He developed the three-high universal plate mill and the four-high, 206-in. plate mill which is the largest in the world. He is a noted technical authority on steel plate.



FRANK H. GORDON, vice-president in charge of sales of the Lukens Steel Co., started work with the company in 1895 as errand boy. He was made assistant general sales agent in 1903 and sales agent in 1907. He was elected to his present office in 1928 and is also a director of Lukenweld, Inc., and of By-Products Steel Corpn.

HORACE B. SPACKMAN, a director of Lukens Steel Co., entered the employ of the company in 1881. He became purchasing agent in 1892 and was made a director in 1897. He became second vice-president in 1900 and served until 1929, when he retired from active duty.



of Great Britain were detrimental to the success of the iron industry."

Despite parental protest, however, Mr. Pennock, about 1793, proceeded to build the Federal slitting mill at Rokeby, situated on Buck Run, in Chester county, about four miles south of Coatesville, and began the production of iron. The enterprise proved successful. Charcoal slabs were heated in an open charcoal fire, rolled out into plates and then slit up into rods for general blacksmith use. Slabs were obtained from charcoal bloomeries in the nearby valleys.

The sawmill property on the Brandywine Creek, where Coatesville is today, was purchased by Mr. Pennock in 1810, and the mill changed in con-

W. J. BASSETT, comptroller of the Lukens Steel Co., entered the employ of the company in 1912 after service with Phoenix Iron Co., Illinois Steel Co. and several other concerns. He was elected to his present office in 1926.

G. DONALD SPACKMAN, president of Lukenweld, Inc., came with the Lukens Steel Co. in 1919 later receiving an M.E. degree from Swarthmore. He was made fuel engineer in 1920; superintendent of flanging department in 1925, and assistant general superintendent in 1929. In 1930, upon the formation of the Lukenweld division, he became its president.

J. H. McELHINNEY, general superintendent of the Lukens Steel Co., was graduated from the University of Pittsburgh in 1909. Previous to joining the Lukens organization in 1926 and in addition to a year and a half of war service in the army, he worked for United Engineering & Foundry Co., Youngstown Sheet & Tube Co. and Columbia Steel Co.

ROBERT W. MOFFETT, president of By-Products Steel Corpn., joined the Lukens Steel Co. in 1926 after serving eight years with American Car & Foundry Co. and eight years with Shippers Car Line, Inc. He was elected to his present position in 1927, upon the formation of the By-Products division.

struction in order to be suitable for iron manufacture. It was known variously as the "Brandywine Mill," "Brandywine Iron Works" and "Brandywine Rolling Mill."

Leasing the property in 1816, Dr. Lukens, son-in-law of Isaac Pennock, carried on the business until his death in 1825, his first account books dated Dec. 7, 1816, being captioned "Brandywine Iron Works and Nail Factory," the nails being cut from the ends of the sheets.

Single charcoal iron blooms made in old-fashioned forge fires, reheated over an ordinary grate fire, were used in the rolling of boiler plate, which were shipped rough. The plate rolls were about 16 in. or 18 in. in diameter and from 3 ft. to 4 ft. long. The bellows were of the

IN the group below and shown also in the preceding two pages are the 228 living employees of the Lukens Steel Co., each of whom has had 25 years of more of continuous service. The aggregate service to Lukens, of the group, is 7551 years.

old style, walking beam pattern, and outside of the forge, the mill, and a large anvil for hammering plates flat with sledges, there was almost no other equipment.

The water-wheel, which never developed more than 100 hp., was supposed to operate the mill, which frequently threatened to stall by a "sticker" when the plate was going through. Workmen would rush to the water-wheel, and, hanging on the rim, would by their weight force the "pass" through the rolls. In those days the controlling factor for the establishment of a mill was waterpower, though another factor which encouraged the erection of mills in the eastern part of Pennsylvania were deposits of ore which abounded throughout the region. The Cornwall deposits were especially famous.

In those days there were no railroads. Even when in their best conditions the dirt roads were rough, and teaming was extremely expensive. In the spring the roads were impassable. The mill's market was confined to an area of 50 to 75 miles, unless shipments were made by water from Philadelphia, 38 miles away, or from Wilmington, Del., a distance of 26 miles. Subsequently, when it began to use coal, the mill hauled it from Columbia, 42 miles away. Teaming to Philadelphia cost $4 per short ton.

With the growth in business, and the necessity for more power, the overshot wheel gave way to a breast wheel which was geared to produce more power to the rolls. With it was a flywheel geared to high speed for the storage of power. These improvements allowed the use of larger rolls which were changed to 21 in. in diameter and 66 in. long. Later scrap from plate shearings was worked up, made possible by the installation of a reverberatory furnace.

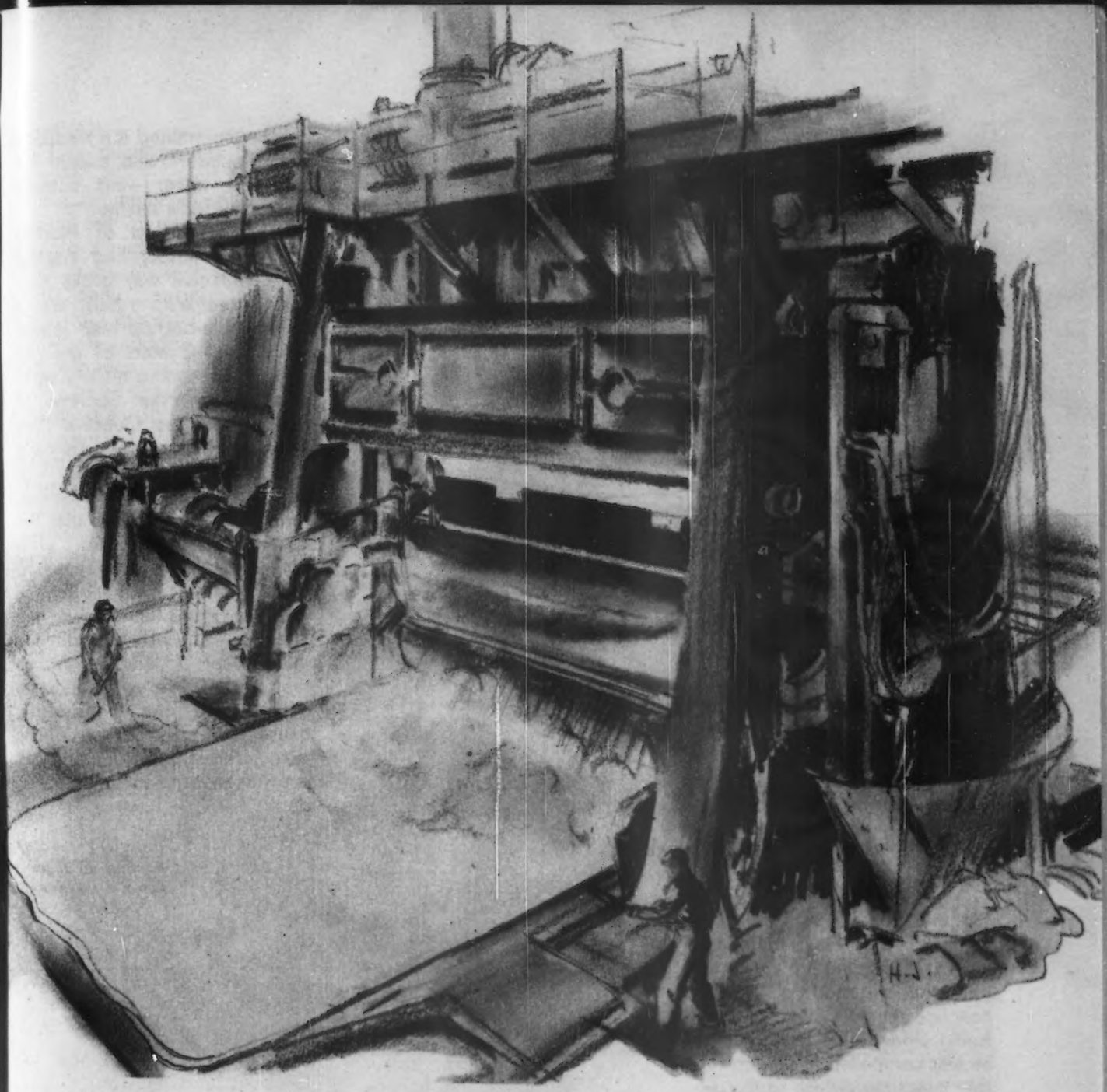
The next interesting development in the history of the plant saw a resolute, capable woman take charge, America's first woman iron maker. It was Rebecca Webb Lukens, widow of Dr. Lukens. It was at his special request that she succeeded him upon his death, which took place in 1825. A daughter of Issac Pennock, she met Dr. Lukens, then a practicing physician of Abington, Pa., in Philadelphia, in the war year 1812. Miss Pennock had formerly attended a boarding school in Wilmington, but in that year had returned to Rokeby and was living with her parents near the Federal Slitting Mill.

Mrs. Lukens carried on the manufacture of plates, sheets, rods and nails. Despite the fact that she had not only a nearly bankrupt mill to finance, was unfamiliar with the business and had four children to mother she assumed full control and management of the commercial end of the business. Solomon Lukens, brother of Dr. Lukens, was placed in charge of the mill. Charles Brooke, a friend, supplied her iron on credit for a reasonable time. James Sproul, grandfather of Ex-Governor William C. Sproul, also joined Mr. Brooke in helping her by furnishing charcoal blooms on credit. Mrs. Lukens was noted for her keenness in making prices which were profitable, yet fair and acceptable to buyers. Costs really were a matter of guessing in those days of no cost systems and double entry, but Mrs. Lukens proved to be an able and successful manager. In nine years she paid off all of Dr. Lukens' debts, paid the balance due to the Pennock estate on the mill and farm and practically rebuilt the old mill throughout. She put in a new dam, a breast wheel, new furnaces, a new millhead and a larger mill house.

In 1840, when Solomon Lukens wanted to return to the farm, she brought in another brother-in-law, Joseph Bailey, who became her partner, under the title, "R. W. Lukens & Co." In 1843, Abram Gibbons, Jr., who married the oldest daughter of Mrs. Lukens, succeeded Mr. Bailey, the name of the partnership remaining the same. In 1847, a revision of the partnership was entered into for two years (the original article of agreement being still in existence). The title of the firm then became "A. Gibbons, Jr., & Co.," Mrs. Lukens being the silent partner.

Indicative of Mrs. Lukens' business sagacity, together with interest in the welfare of her employees, was her agreement to give them a premium if they would increase the yearly output up to 500 tons. Records make clear the difficulties she encountered in years of depression, particularly in the early forties, when, due to tariff reductions, employees were working only half-time.

In October, 1849, Dr. Charles Huston, who in 1848 had married the younger daughter, Isabella, became a partner, the firm name changing then to "Gibbons and Huston." Mr. Gibbons retired in 1855 and Dr. Huston assumed entire ownership and management of the business for four years until 1859, when Charles Penrose, Jr., a nephew of Mrs. Lukens, became a partner, and then the name "Lukens Rolling Mill" was first used in honor of Dr. Lukens and his widow, Mrs. Rebecca Lukens, who had started and built up the manufacture of charcoal iron boiler plate. In 1876 Abraham Francis Huston, oldest son of Dr. Huston, and later, in 1880, Charles Lukens Huston, younger son and name-



THE largest plate mill in the world. It is a 206-in., four-high mill built for Lukens by United Engineering & Foundry Co. While the regular commercial limit of width is 186 in. for rectangular plates as well as circles, this mill has rolled plates up to 198 in. in width and on a few occasions under special arrangements, plates of even greater width have been produced. In thickness, the mill can roll plates up to 25 in. The mill can handle ingots weighing up to 70,000 lb.

sake of his grandfather, both graduates of Haverford College, came into the partnership and the title of "Huston and Penrose and Company," was continued until the death of Mr. Penrose in 1881. The firm name then became "Charles Huston and Sons," which was continued until incorporation of the business under the title of "Lukens Iron and Steel Company" in 1890. It was in 1917 that the present name of Lukens Steel Co. was adopted.

Development of the modern iron and steel industry as it exists today began with the regime of Dr. Huston. Like his father, he was a well known physician, possessed of a keen, searching scientific spirit which he applied to the business as he had applied it to his profession. Graduated from the University of Pennsylvania in 1840, Dr. Huston spent three years in the study of medicine at Jeffer-

Scene at one of the Lukens open-hearths.

Thus he maintained the tradition of the founders, who, except for marriage, never went outside the family for a partner.

The partnership of Huston & Penrose hardly had started when the civil war broke out. Business came to a halt. Most of the able-bodied men joined the army. Owners of the mill as in its preceding history were members of the Society of Friends, and as Quakers they were pacifists. No contract was consciously made for war work. If it were found that material was for military use the contract was canceled. This policy was strictly adhered to through the war of 1812, the Civil war the Mexican war, the Spanish war and through the World war up to 1917 when the United States became a belligerent. Then, considering cause and country above private interest the company accepted government military orders.

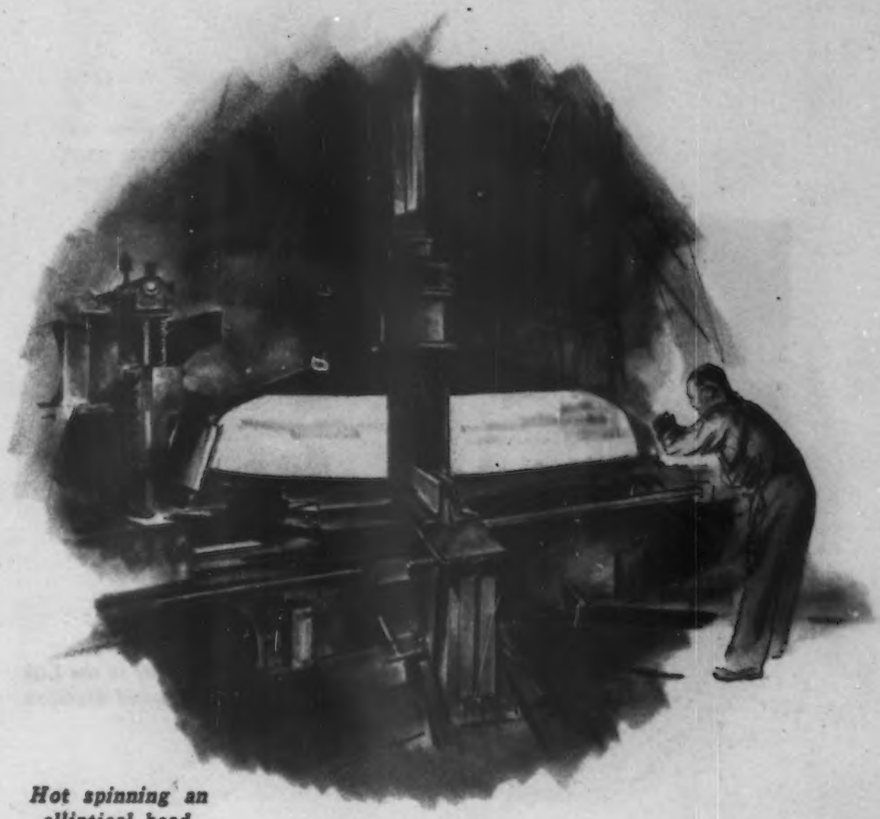
son and for a year and one-half studied at Heidelberg and Paris. Returning to Philadelphia, he engaged in medical practice there. City conditions being unfavorable to his health, he was compelled to forego further practice. Much to the distaste of his father, he decided to go into business. Finding it necessary to live in the country, Dr. Huston settled in Coatesville in 1849, engaging in the manufacture of iron. On the side he was engaged in the Rail Road forwarding business. This business in those days performed service like that of the modern express company and Dr. Huston saw a future in it because by that time the Pennsylvania railroad had been built out through Coatesville to Columbia and west. He formed a partnership with George W. P. Coates, his wife's first cousin.

Raising an ingot from a soaking pit.

Applying himself closely to the study of metallurgy, and making improvements in the mill during the Civil war, Dr. Huston put in a new breast wheel geared so as to convey more power to the rolls. He also introduced a great, heavy flywheel geared to a high speed to store power and keep the tremors of the water wheel from instantly being reflected in the movement of the rolls. This allowed him to go up to rolls 21 in. in diameter and 66 in. long in keeping with the demand for wider and longer plates.

In 1875 when the United States government began requiring that plates used in the construction of steamboat boilers should be stamped with their tensile strength, Dr. Huston purchased a testing machine and began investigating the physical properties of iron and steel. His service given the government contributed greatly to adoption of inspection rules by the Steamboat Inspection Service and of standards tests by insurance companies so as to insure high grade boiler plates and to their widespread use on steamboats, locomotives, etc.

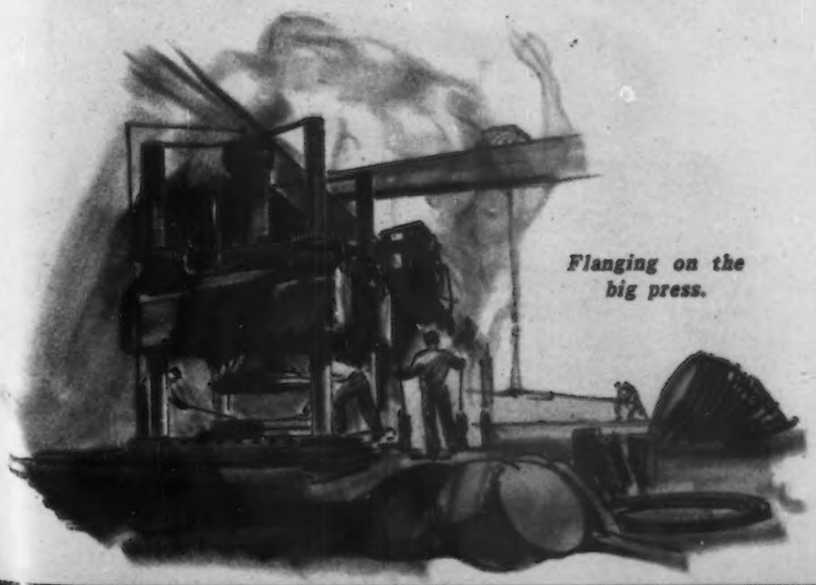
In 1870, Dr. Huston abandoned altogether the old mill practice. He installed steam power, and a two-high plate mill with chilled rolls, 25 in. in diameter and 84 in. long. The old mill was equipped with puddle rolls to prepare stock for the new mill.



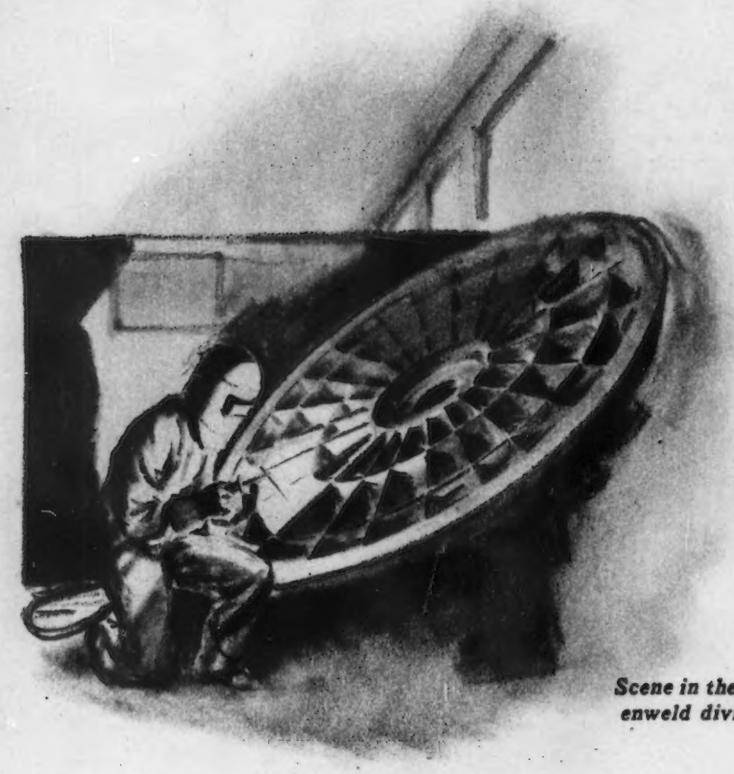
Hot spinning an elliptical head.

It was during the period of the depression which continued from the 1873 panic to 1876 that Dr. Huston began to be recognized as the foremost authority on boiler plate in the country. It was for this reason that he was called upon by the Federal government, insurance companies and other sources to develop standards of quality. He contributed papers on the behavior of iron and steel under varying conditions of heat and stress which were published in the Journal of the Franklin Institute in 1878-79. Years later these papers were accepted by metallurgists of Europe as standard. It was during this period, with its great railroad building, that the company began what is today its large railroad business.

About 1876, farm tractor engines began to be sold in midwestern states. The strain proved too much for their boilers. A. F. Huston studied and discovered the cause, remedied the trouble and sold his steel on the basis of exact knowledge of service requirements. It was also at this time that Dr. Huston concluded that the new "mild" steel would be a better material for boilers than iron and he began to experiment with the rolling of steel boiler plates and to accumulate data. Rolling with equipment which had been used for iron was unsuccessful. Many



Flanging on the big press.



Scene in the Lukenweld division.

rolls were broken. It was decided to build a new three-high, finishing roll train. Slabs were purchased in Pittsburgh and Harrisburg, and later Scotch steel was imported, but in 1891 the company put in open-hearth furnaces and since then it has used its own steel.

From time to time the Lukens plant was improved and capacity added until it became the large, modern unit it is today with a country-wide market, notable for obtaining and keeping its customers, large and small. With an enviable record of achievement, the Lukens company of today, beginning with its origin by Isaac Pennock, has a history that parallels the growth of the American Republic itself.

Striking evidence of the growth of the plant is given by adverting to the yearly output of 500 tons finally attained through the efforts of the indefatigable Mrs. Lukens. In 1875 the output was 2135 tons of iron plates. In 1890 the production was 2945 tons of iron plates and 11,445 tons of steel plates. By 1898 the production of iron plates entirely ceased. In 1929, the peak year, the output was 393,616 tons of steel plates.

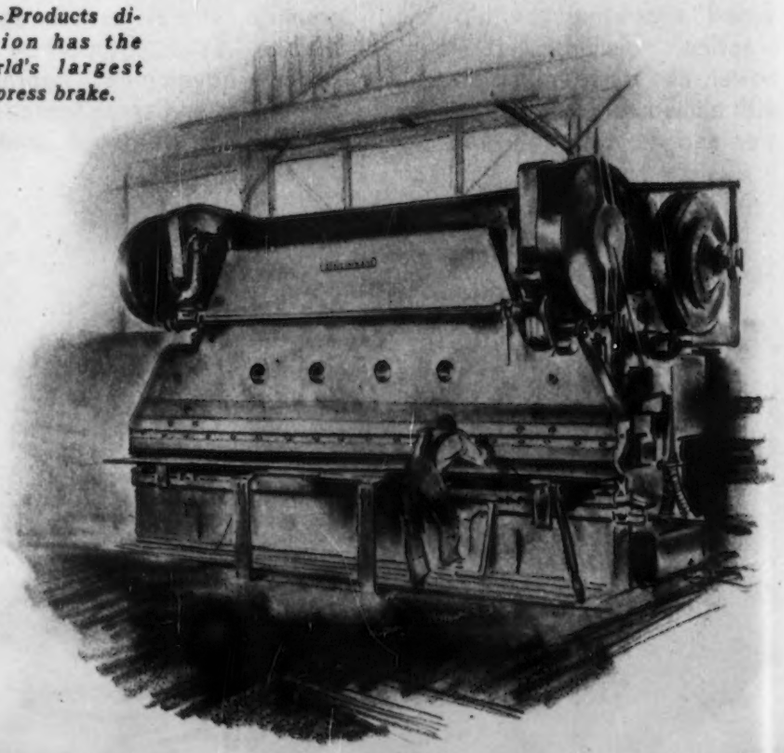
The company was incorporated as the Lukens Iron & Steel Co. in 1890. The following officers were elected: President, Dr. Charles Huston; vice-president, A. F. Huston; treasurer, Joseph Humpton; secretary, R. B. Haines, Jr.

Upon the death of Dr. Charles Huston in 1897, he was succeeded by A. F. Huston as president, Charles L. Huston becoming vice-president.

A. F. Huston, having come into the business in 1872, filled various clerical positions in the works and in the office, until a breakdown occurred in Dr. Huston's health, when the former assumed charge of the commercial end of the business. Dr. Huston contined in an advisory capacity as head of the concern as long as he lived.

Charles L. Huston, having come into the business in 1875, filled a succession of positions from office boy to shipping clerk and accountant, until Mr. Penrose's death in 1881, when he began the management of the works, planning and supervising the development of the entire plant until 1925. He as-

By-Products division has the world's largest press brake.

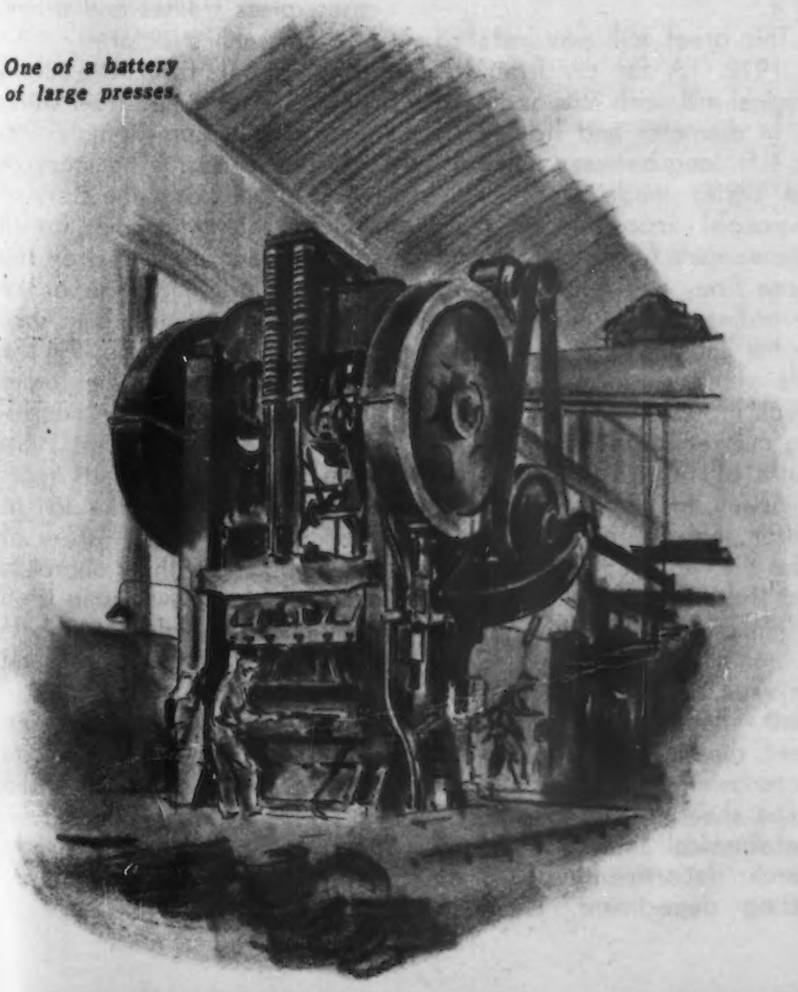


sisted his father and followed his training in investigation and testing the properties of iron and steel plates, making a specialty of adaptation of quality to use.

The two brothers cooperated in the general development and conduct of the company's affairs, each looking especially after his own department, until they both relinquished active participation in 1925, the development from a concern employing about 100 men to one employing 2000 men taking place while in their hands.

When in June, 1925, A. F. Huston was made chairman of the board he was succeeded by Robert W. Wolcott, the present president. Mr. Wolcott then became one of the youngest presidents of a steel company, being only 32 years of age when he was elected. Previously he was manager of the Lukens Fabricating Plant and Warehouse at New Orleans, serving from February, 1922. Previously he had served as a lieutenant-commander in naval aviation during the war, and later had been with Bethlehem Fabricators, Inc.

Irregular forms, as well as regular ones, are cut from thick plates with precision.



One of a battery of large presses.

In these days of widespread labor agitation it is especially interesting to note the record of the Lukens Steel Co., whose man-to-man relations with its employees have left it almost free of labor trouble throughout its long history.

The open shop policy, open to union and non-union men alike, has always been maintained. The only strike the company has had was in 1887, when the old Knights of Labor called a sympathetic strike and endeavored to tie up the railroads and heavy industries of Pennsylvania. The Lukens employees went out for 13 weeks, after which they returned.

"If we have a labor policy,"

said First Vice-President Huston, "it is this: Treat all men fairly and in person. Live with the work and the workmen. Pay honest wages for honest work —and pay those wages at the time they are earned. Pay for everything that is earned."

The company has a welfare association with membership made a condition of employment at the employees' request, entirely managed by the workers themselves with the aid of the employment office. Started by Dr. Huston in 1873, it is the medium of maintaining a savings and insurance fund as a means of promoting self-reliance and family protection.

The workers also have a cooperative store of their own. The company has nothing to do with the store beyond aiding in providing the quarters. It is managed by a committee and membership is open to all employees, although no man may hold more than $10 worth of stock.

Everywhere throughout Coatesville are families in substantial homes which they themselves own and who, almost beyond memory, have worked in the Lukens plant. They have grown up with the plant just as have the officers of the company. The company has on its payrolls employees whose fathers, grandfathers and great-grandfathers have worked for it. The long, continuous service record of employees is notable. One employee, John Trupe, aged 75, went to work for the company at the age of 13 years and is still on the job, a service of 62 years. The average service for the five who have been longest in the employment of the company is almost 51 years. An employee with a record of only 10 years service is almost a newcomer.

Participating in the rapid strides over the entire span of time from the year 1810, the Lukens company has seen this country take the foremost position as a steelmaking nation, with one-half of the world's capacity. The Lukens company itself now has an annual capacity of 686,500 tons of steel ingots. From the maw of a soaking pit it draws ingots weighing 90,000 lb., which are carried to a 206-in. mill that rolls plates 25 in. in thickness or up to 198 in. wide, the largest plate mill in the world. Not only is it the largest plate rolled but it is the largest plate that can be shipped within the existing railroad clearances.

During Dr. Huston's early connection with the business a "pile" weighing 500 lb. was so unusual that "half the town would turn out to see it rolled in the mill." Now, an ingot of 90,000 lb. may be rolled and no one outside of the direct operating organization be aware of it.

This great mill was installed in 1918. A far cry from the original mill, with rolls about 16 in. in diameter and from 3 ft. to 4 ft. long between housings, the plates made from single charcoal iron blooms, the blooms made from old-fashioned forge fires, and reheated over an ordinary grate fire. Today on the 350-acre site at Coatesville stands a modern plant which includes steel works, rolling mill equipment and the works of two divisions of the company, the By-Products Steel Corpn., and Lukenweld, Inc. Besides the two open-hearth plants and the 206-in. plate mill are a 140-in. plate mill, a 112-in. plate mill, an 84-in. plate mill, a 48-in. universal mill, flanging department, flame-cutting department, shearing departments for rectangular, circle and other shape shearing, machine shop, metallurgical laboratories, research department, physical testing department, chemical laboratories and many other units necessary for the up-to-date production of quality material. Lukens products include steel sheets and plates in carbon and a wide variety of alloy analyses, including nickel-clad steel, as well as flanged heads and other formed shapes for plate and structural fabrication, for railroad rolling stock and equipment, and for the chemical, petroleum, marine, machinery, construction and other industries.

By-Products Steel Corpn., one of the two Lukens divisions, produces a wide range of sheared, blanked and pressed shapes and has the largest machine of its type ever built for the bending, flanging, forming and multiple punching of steel plates. The other division, Lukenweld, Inc., is noted for the design and fabrication, by arc welding, of machinery and equipment units such as Diesel engine crankcases, press frames and a host of other such structures.

"Great oaks from little acorns grow." And great steel works have sprung from homely fireside enterprises. The story of Lukens Steel Co. is the story of a sturdy oak which has grown from the acorn planted on the banks of the Brandywine, at the site of Coatesville by Isaac Pennock, 125 years ago. An oak that has weathered the forces and fury of five major depressions, because its fibers have been kept sound and its roots have gone deep in the soil of public service. The history of this company, with its unbroken chain of family ownership is an inspiring example of the best American tradition in iron and steel.

To owners, management and workers of the Lukens Steel Co., on this notable occasion, The Iron Age extends congratulations and good wishes, as do its host of friends in the industry.

NEWS OF THE WEEK

Manufacturers Oppose Graduated Corporation Tax as Unsound in Principle

THE proposed graduated tax upon the net income of corporations has been described by the National Association of Manufacturers as "unsound from whatever aspect it is considered" and as "an attack upon the welfare of millions of consumers and upon millions of thrifty people who have invested their savings in business corporations."

In a statement analyzing the effects of the proposed legislation upon the country and its harmful effects upon the millions of small shareholders, the association said:

The proposal for a graduated tax upon the net income of corporations, the corporation with a large income to have a higher tax rate upon its income than the rate at which a small corporate income is taxed, is unsound from whatever aspect it is considered.

As an income producing measure it is inadequate. Under the rate schedule suggested by the Senate Finance Committee it has been estimated that the graduated corporation income tax would raise between $40,000,000 and $100,000,000 additional revenue a year—an amount equal to the continuing Federal deficit for from one to two weeks of the year.

It is admittedly a proposal designed to facilitate redistribution of wealth; it is, in other words, a reform measure and not a tax measure. By adding new tax burdens, by proposing unsettlement of relationship between corporations and their stockholders, it is, in fact, an anti-recovery measure.

This is not a small problem involving only a small number of corporations with large incomes. The proposal affects millions of persons. A corporation is simply an aggregation of individuals who have invested in the same enterprise. There are nearly 10,000,000 registered owners of common stocks listed on the New York Stock Exchange and additional millions of owners of companies listed on other exchanges or not dealt in on any security exchange. Even allowing for duplications of stock holdings there remain millions of Americans who are part owners of business corporations.

There is a greater diffusion of ownership and wealth in the United States than in any other country. It is now proposed to levy higher taxes upon the corporation in which there is the greatest diffusion of ownership. The result would unquestionably tend toward a decreased number of small investors in large corporations and thus toward increased concentration of wealth ownership, an objective contrary to the announced aims of its own sponsors.

Corporations are not simply large pools of wealth; they are owned by great masses of individuals. The average individual investment in corporations is $2,700, with millions owning less. These investors have every right to expect and demand that the Government shall treat them fairly and without discrimination.

A graduated corporation income tax is unfair to millions of stockholders since the rate of tax suggested bears no relation to the percentage of profit earned on the investment, and since it taxes the millions of small investors in corporations having large incomes at a higher rate than either large or small investors in small corporations.

A graduated corporation income tax is, moreover, a penalty on efficiency. It says, in substance, that whenever a corporation makes a sufficiently good product to attract customers and earns a substantial profit, it shall be taxed more than the corporation with less customer demand and smaller profits.

If a graduated corporation income tax had been in effect the past 35 years, the full results of scientific and business efficiency would not have been realized, and automobiles, vacuum cleaners and electric refrigerators would today cost much more than their present prices.

The graduated corporation income tax proposed is primarily a reform measure, would be inadequate as a revenue producer, penalizes small investors in successful companies and would increase living costs with resultant lower living standards. It is an attack upon the welfare of millions of consumers and upon millions of thrifty people who have invested their savings in our business corporations.

Steel Engineers to Meet at Pittsburgh

THE thirty-first convention and iron and steel exposition of the Association of Iron and Steel Engineers will be held at the William Penn Hotel, Pittsburgh, Sept. 24, 25 and 26.

Approximately 30 technical papers covering every phase of steel mill operations will be read before this gathering of operating engineers. In addition to purely technical subjects, Arthur H. Young, vice-president in charge of industrial relations, United States Steel Corpn., will deliver a paper on the many diversified problems that come under his supervision. Plans are also being made by the society to secure a member of the Federal Housing Administration to speak, as the industry looks forward to the development of the steel house as a huge consumer of many steel products.

The association is also sponsoring a display of steel mill machinery in the exhibit halls of the hotel where over 80 manufacturers of equipment have reserved booth space. Many of these exhibits will be in actual operation.

PERSONALS

S. D. WILLIAMS, since 1932 assistant director of sales for the Timken Steel & Tube Co., has been appointed manager of tube sales, with headquarters at Canton, Ohio. He has been identified with the steel industry since his graduation from Lehigh University in 1913, having started work with the Carnegie Steel Co. He subsequently became superintendent of open-hearth operations for the Central Iron & Steel Co. and later associated himself with the Pittsburgh Crucible Steel Co. as chief metallurgist. Mr. Williams joined the Timken Steel & Tube Co. as metallurgical sales engineer in 1926.

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JOHN W. MACMORRIS, formerly machine shop superintendent and at one time head of the old Skayef plant in Hartford, Conn., has been made general superintendent of the Chance-Vought Corpn., East Hartford. JOSEPH M. BARR, heretofore chief inspector, has been made factory manager and ROBERT WITBECK, formerly with the Hamilton-Standard Propeller Co., becomes chief inspector. Mr. MacMorris, who has had an unusually broad and active career in the fields of shop practice and factory management, began his career as an apprentice in the yards of the F. W. Wheeler Shipbuilding Co. and since that time has been identified with manufacturers of cash registers, adding machines, electrical specialties, tools, automobiles and ball bearings.

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PHILIP O. GEIER, chairman of the board and treasurer of the Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati, Ohio, has been appointed trustee of the Cincinnati Southern Railway by the judges of the Hamilton County Court of Common Pleas. The appointment is for life. The railway is owned by the City of Cincinnati.

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H. S. VASSAR, of the Public Service Electric & Gas Co., Irvington, N. J., has been elected president of the American Society for Testing Materials. A. E. WHITE, University of Michingan, Ann Arbor, is vice-president. New members of the executive committee are W. H. GRAVES, Packard Motor Car Co., Detroit, R. L. HALLETT, National Lead Co., Brooklyn, N. Y., N. L. MOCHEL, Westinghouse Electric & Mfg. Co., Philadelphia, H. H. MORGAN, Robert W. Hunt Co., Chicago, and W. R. WEBSTER, Bridgeport Brass Co., Bridgeport, Conn.

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W. M. MCCONNELL has joined the engineering department of Patterson Foundry & Machine Co., East Liverpool, Ohio, and has been placed in charge of the drafting room. He was graduated from Carnegie Institute of Technology with a degree in Chemical Engineering and took special courses at Columbia University. He has been connected with the Koppers Co., Pittsburgh, and the American Cyanamid & Chemical Corpn.

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FREDERICK C. BARR, consulting engineer, Harley-Davidson Motor Co., Milwaukee, has returned from a stay of two years in Japan, where he directed establishment of a factory for the Harley-Davidson Sales Co., not financially affiliated with Milwaukee concern, but handling the entire Japanese territory. The new factory was opened to manufacture the rear section of three-wheel delivery motorcycles as well as certain parts of the cycles which it is cheaper to make than import from Milwaukee.

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H. P. BOGGIS has been appointed to handle small tool sales of cutters in the Cleveland and northern Ohio territory for the Ingersoll Milling Machine Co., Rockford, Ill.

L. DOUGLAS SMITH, whose appointment to the vice-presidency of the Lewis Foundry & Machine Co., Coraopolis, Pa., was announced in these columns June 13.

He will make his headquarters at 2075 East 79th Street, Cleveland.

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PAUL J. KRUESI, president, Southern Ferro Alloys Co., Chattanooga, Tenn., has been awarded the honorary degree of Doctor of Science by Union College. He was graduated from that institution in 1900.

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FRANKLYN W. WAGNER, who has been identified with the Haslett Chute & Conveyor Co., Oaks, Pa., since 1923 successively as chief draftsman, Philadelphia and New York sales manager and as chief engineer, has been made vice-president and general manager, succeeding C. H. CHUBBUCK, who has resigned on account of ill health.

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JAMES J. ZIMMERMAN, heretofore statistician for the Eastern Bituminous Coal Association, has joined the organization of the Osborn Machine Co., DuBois, Pa. He was formerly production manager for the Elliott Co. and assistant general superintendent of the Scott foundry department of the Reading Iron Co.

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W. S. LONG, formerly manager of mechanical sales in the Seattle district for United States Rubber Products, Inc., has been transferred to the Los Angeles district as manager. C. W. GILMER, of the San Francisco office sales staff, has been placed in charge of the Seattle district.

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MARK SPRALEY, for several years assistant sales manager of the Joyce-Cridland Co., Dayton, has been made sales manager of the pump division of the Acme Machine Products Co., Muncie, Ind.

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O. Q. HINDS, formerly road machinery supervisor for the Allis-Chalmers Mfg. Co., has been made special road machinery representative for the Caterpillar Tractor Co.

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L. R. VEATCH has been appointed to handle sales and engineering in Buffalo and surrounding territory of conveyors made by the Stephens-Adamson Mfg. Co., Aurora, Ill.

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JOHN G. BARRY, senior vice-president of the General Electric Co., has been elected to an honorary vice-presidency, on the occasion of his retiring after more than 45 years of service. He started with the company as an apprentice and test man with the old Thomson-Houston Co. and has been active head of the apparatus sales organization for many years.

FRED W. KULICKE, formerly with the E. G. Budd Mfg. Co., Eclipse Machine Co. and the Baldwin Locomotive Works, has been made Philadelphia sales and engineering representative of the Rollway Bearing Co., Inc., Syracuse, N. Y.

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P. S. MCCUTCHEON and W. H. BLOUNT have been appointed to the active management of the properties of Sleeper & Hartley, Inc., Worcester, Mass. C. S. ARMS continues as consulting engineer on wire mill equipment.

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H. C. STURMAN, formerly identified with H. D. Conkey & Co., has joined the staff of the Richards-Wilcox Mfg. Co., Aurora, Ill., and will be in general charge of sales in the overhead materials-handling division.

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E. R. SHEQUINE has become New York district manager of the industrial stoker division of the Combustion Engineering Co., New York.

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JOSEPH R. EGGERT has been made resident manager of the plant at Evansville, Ind., of the Chrysler Corpn., which will begin the assembly of Plymouth cars about Dec. 1. He will be under the direction of PAUL SAUERBREY, vice-president in charge of manufacturing of the Plymouth Motor Corpn.

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CHARLES KENNEDY has been appointed resident factory manager of the Evansville, Ind., plant of the Briggs Mfg. Co., which will build bodies for Plymouth cars.

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JAMES P. BARTON has been appointed sales engineer, electrical sheet division, and will assist Mr. Romig. Mr. Barton was formerly connected in a similar capacity with the Empire Sheet & Tin Plate Co., Mansfield, Ohio. He was graduated from the University of Minnesota in 1927, and entered the employ of the Westinghouse Electric & Mfg. Co., Springfield, Mass., and in 1930 he became associated with the General Motors Radio Corpn., Dayton, Ohio, as section engineer. In 1933 he joined the Empire company.

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L. C. UPTON, Upton Machine Co, St. Joseph, Mich., has been named president of the Michigan Manufacturers' Association. EDGAR R. AILES, Detroit Steel Products Co., Detroit, has been chosen first vice-president. Among the directors elected were R. R. HICKS, American Steam Pump Co., Battle Creek; D. R. WILSON, Wilson Foundry & Machine Co., Pontiac; and FRED BUCK, Lumkin Rule Co., Saginaw.

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WILLIAM W. COLEMAN, president of the Bucyrus-Erie Co., South Milwaukee, has returned from Europe, where he spent three months, principally at the offices of his firm's British affiliate, Ruston-Bucyrus, Ltd.

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HOWARD LINN has been appointed superintendent of the Carnegie Steel Co.'s 42-in. strip mill now under construction at the McDonald mills, McDonald, Ohio. Born in 1900, Mr. Linn received his formal education at the University of Pittsburgh. He started his business career with Superior Steel Co. at Carnegie, Pa., in 1914. In 1927 he went with the Weirton Steel Co., serving as foreman, assistant day superintendent and then night superintendent respectively in the strip mill department. He remained with the Weirton company until May 1, 1935, when he joined the Carnegie Steel Co.

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MATTHEW W. POTTS, for the past nine years sales engineer for the Alvey-Ferguson Co., has been appointed eastern sales manager for the Saginaw Stamping & Tool Co., Saginaw, Mich.

Mr. Potts' new connection is a continuation of his work in the materials handling field, as the company manufactures casters, wheels and conveyor parts, as well as trailers and automobile accessories.

CHARLES W. DANIELS, new general sales manager of the Harnischfeger Corpn., Milwaukee, whose appointment was announced in these columns June 20.

Norton Co. Makes Sales Dept. Changes

THE Norton Co., Worcester, Mass., has announced a change in the set-up of its sales departments. Formerly separate sales organizations were maintained for each of its product divisions, such as grinding wheels, abrasive grain, non-slip floors, and others. Now the sales of all of its abrasive products have been combined into one division known as the abrasive division. The sales department of this abrasive division consists of two parts, one known as sales planning and development and the other as sales operation.

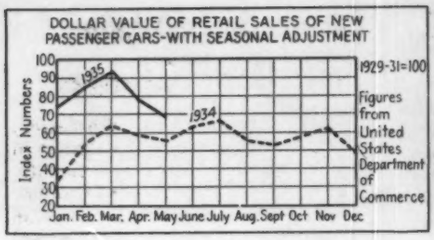
Sales planning and development will be concerned with sales research, publicity, sales promotion, traffic relations, business relations, trade association activities and all other activities pertaining to sales development. This work will be in charge of Wallace T. Montague, manager, sales planning and development.

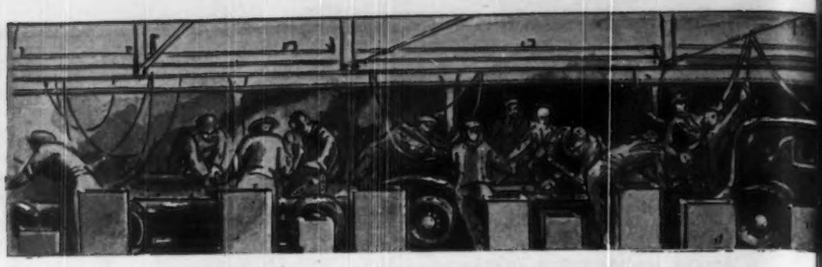
The sales operation section will be responsible for directing all of the office and field sales operations of the abrasive division, including the control of the sales engineering department. W. R. Moore is sales manager and will have as assistant sales managers E. C. Hughes, handling wheel, grain and pulpstone sales; and Robert Kirkpatrick, handling sales of refractories, non-slip floors and boron carbide. R. M. Johnson will continue as sales engineer, but include in his duties the direction of sales engineering work of all abrasive products.

All of the foregoing activities come under the supervision of W. L. C. Neilson, vice-president in charge of sales, and H. K. Clark, general sales manager.

The following appointments concerning changes in field organization personnel are also just announced by Norton Co.: C. W. Jinnette, for many years district manager for Michigan, becomes regional manager, sales planning and development. His work in the districts located in the Middle West will be directed to those phases of sales planning and development which the company has recently consolidated into a separate section of the sales department.

P. H. Clapp will be transferred from the Pacific Coast to Detroit, assuming the responsibilities and title of district manager for Michigan. P. S. Wiswell, recently divisional manager for Behr-Manning Corpn., Chicago, has been transferred to the Pacific Coast.





THIS WEEK ON THE

Car Manufacturers Expect to Complete Production Runs Early in August

DETROIT, July 2.

CAR manufacturers are on the last lap of the 1935 production race and should cross the finishing line in August. In the case of a few makers, such as Chevrolet, a final burst of speed has developed, but most companies, after an astonishing sprint for several months, are easing comfortably to a halt at the end of their model runs.

Chevrolet will be operating full tilt on assemblies up until the close of August. Its gray iron foundry at Saginaw, which makes its cylinder blocks and other important castings, is scheduled to go down around Aug. 15 for the changeover and probably will reopen on 1936 work immediately after Labor Day. That means that the Flint plant and the gear and axle and forge plants in Detroit should be into the production of new parts in September, with assemblies of cars starting about Oct. 1. A few cars may come off the lines in September.

Ford's output in July is variously estimated at 63,000 to 75,000 cars and trucks, the actual number probably depending on the course of sales during the month.

Chrysler's activities are reported tapering. For more than two months Plymouth's sales have averaged better than 9000 a week, crossing the 10,000 mark on three occasions. Last week they were around 9500 cars. Total assemblies of Chrysler-made cars this month should be 45,000 units.

While retail sales are gradually slipping as the summer season advances, the June volume was relatively high. Dodge dealers, for example, made retail deliveries of 8347 cars the week ended June 22 and 8116 the preceding week, compared with 8697 and 9002 in the corresponding weeks in May. Buick sold 2332 cars in the second 10 days of June, as against 2292 in the same period during May. Pontiac puts its retail sales the past month at 14,500 cars, whereas about 19,000 were sold the previous month. Hudson declares that "June is running May a close race."

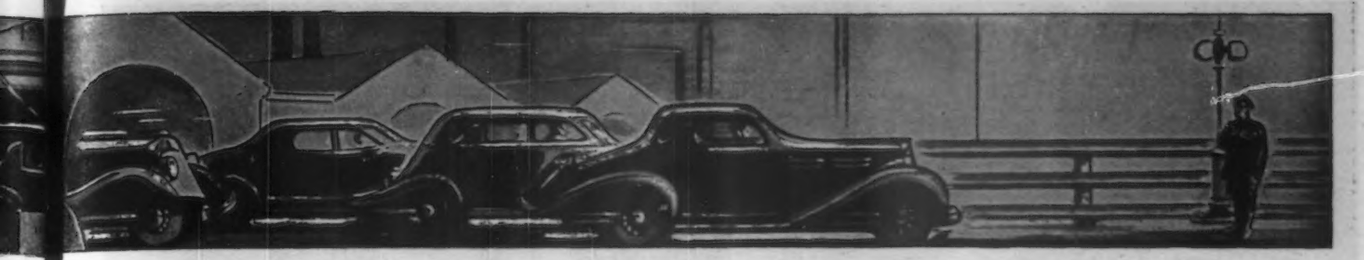
The most troublesome problem to be solved is the log jam in the used car market, particularly on the better 1934 cars priced at $400 and up which were traded in on 1935 cars. Many dealers find a large chunk of their profits tied up in such merchandise and are attempting to discover some way of enticing buyers to invest their money in these cars. There are two classes of used car purchasers —those who will take the older, cheaper models and those bordering on the new car buyer class. Chevrolet, because of a shortage of new cars, has not yet had any trouble with slow-moving used car stocks, and is helping its dealers avoid difficulties by advertising nationally used cars offered by them with a guarantee of dependability. It is believed that this is the first time any car manufacturer has employed national advertising media, such as the *Saturday Evening Post*, in connection with used cars.

Commenting on retail sales this year, an automotive executive points out the substantial number of people with 1934 cars who have bought new cars this year. This would seem to confirm the fact that the same people who had money last year have it this year. The question is, "Will they buy new cars again in 1936?"

Industry Anticipates Good Year

There has been some discussion of the outworn tradition that a presidential year may be an off year for business, and hence 1936 prospects may not be so rosy. Detroit is impatient of those who entertain the thought that next year will not see further progress out of the depression. It is known that leading manufacturers are sighting their 1936 sales guns on goals beyond those attained this year and they appear confident of hitting their mark. R. H. Grant, vice-president in charge of sales of General Motors, is on record to the effect that business next year should be better than this year. Chevrolet alone is tentatively counting on making 1,250,000 of its 1936 models. This figure may be meaningless, because Chevrolet's production will be guided strictly by sales volume, but it reveals the terms in which Chevrolet is thinking.

Steel releases last week consisted mainly of clean-up lots from Chevrolet and a few other companies, the volume exceeding ex-



ASSEMBLY LINE

pectations in the case of at least two mills. Buick is understood to have placed steel orders for the first 25,000 of its 1936 cars and has given shipping releases for steel for 7000 cars. Some new sizes of steel sheets for next year's jobs have been booked, although the tonnage is small and apparently has been ordered for die tryouts. Sizable bookings from the automobile industry are not looked for until close to Aug. 1.

A large automotive parts company unexpectedly received additional business for 1935 cars the past week, after it had been notified that buying had been completed.

Chevrolet looms big in the equipment market. It is reported to be ready to spend $5,000,000 on new machinery for the local gear and axle plant. This program is understood to be the largest in the history of Chevrolet's Detroit plant. The money will be spent for both expansion of productive capacity and for cost-saving purposes. Initial buying is expected this week.

Chevrolet already has made heavy purchases at Flint, a sizeable share of the orders having been for machine tools in connection with installation of a seventh engine production line.

Pontiac has taken bids on machine tools in connection with its program for expanding its production facilities and probably will place orders in the next week. Dodge has solicited prices on several jobs for which new equipment is being considered, but it appears likely that its final expenditures will prove small.

Purchasing officials from Chrysler's Jefferson Avenue plant in Detroit have been transferred to Evansville, Ind., where Plymouth will assemble cars next year. Whatever is needed in the way of equipment will be bought at

BY BURNHAM FINNEY

Detroit Editor, The Iron Age

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Evansville rather than at Detroit. Briggs will do all the stamping work at Detroit for its Evansville body factory. The arrangement at Evansville makes stronger the tie linking Chrysler and Briggs. At the same time Briggs continues as the largest body source for Ford.

Buick, first of the General Motors cars to be introduced, will be idle part of this month prior to the start of operations on 1936 jobs. It is claimed that Buick has given its new line a much snappier appearance. Public announcement is expected the latter part of September.

While final decisions regarding materials for next year have not been made by many companies, stainless steel stands a good chance of gaining ground in the automotive industry, particularly for various beading purposes. Ford apparently intends to retain its present practice of making head lamps out of carbon steel, rustproofing them and then enameling them the color of the car. Ford cars probably will still have an outer shell of stainless.

It is anticipated that practically the entire industry will be shut down from Wednesday night of this week until next Monday morning, since the Fourth of July holiday falls on Thursday. One manufacturer had figured that this week, because of the holiday in the middle, would be an ideal time to close for a full seven-day period, but so many orders came in from its dealers that it has been compelled to operate the first three days.

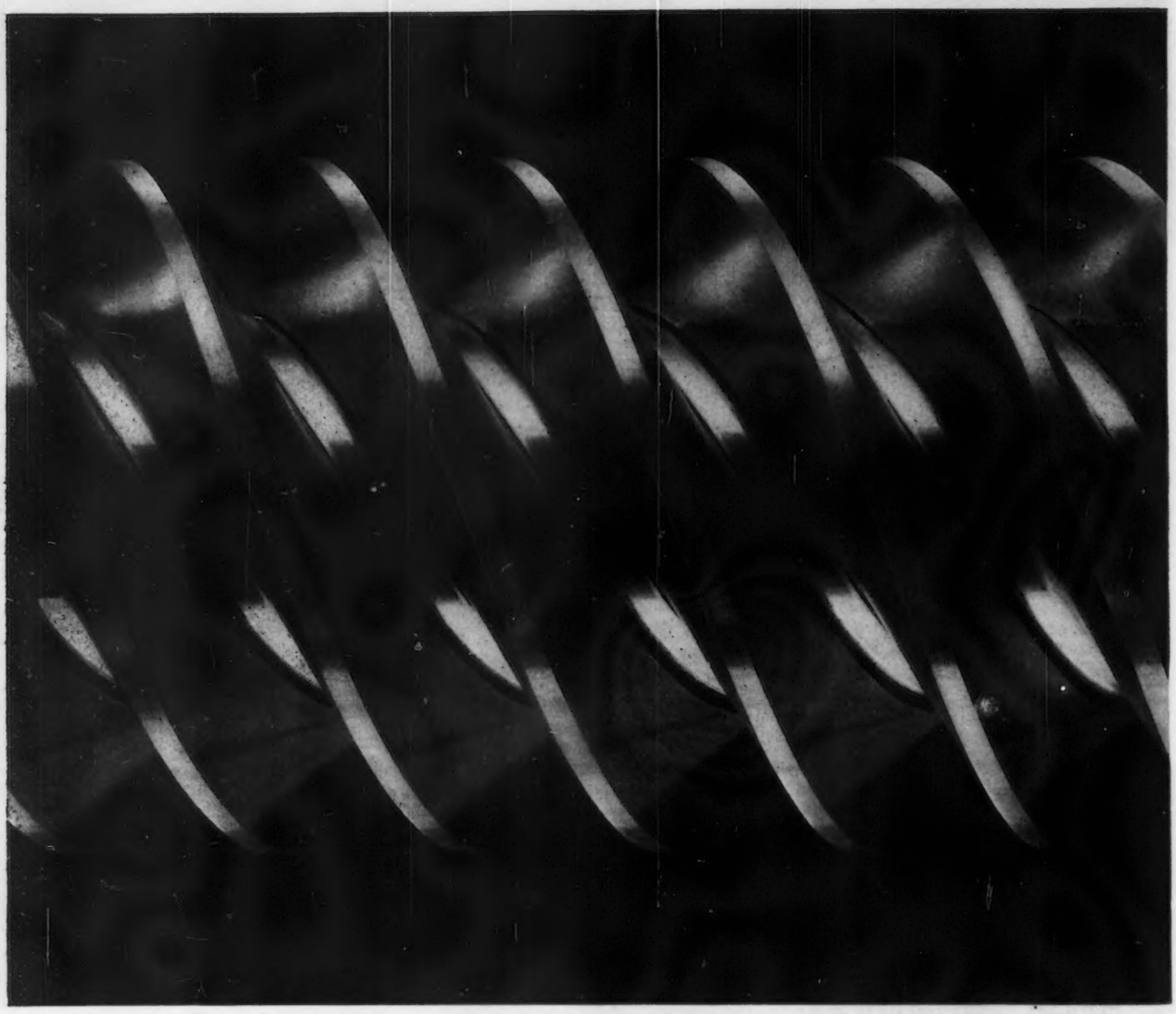
The rapid growth in the popularity of radios installed in automobiles has led at least two important car companies to consider the instalation of radios as standard equipment on all deluxe models in 1936. Final decisions have not yet been made, but it is known that a prominent automobile parts company in Detroit, now about to begin the production of radios, may be the source of supply for one of the interested car manufacturers.

Erratum

The statement made in this column last week that Campbell, Wyant & Cannon Co., Muskegon, Mich., had developed a cast alloy iron piston for the Ford Motor Co. was incorrect. Ford has been experimenting for some time with a cast alloy steel piston, but so far no plans have been made to put it into regular production.

Detroit Notes

Ford's continuous hot strip steel mill will not be in operation until much later than anticipated. It will be at least September or October before it is ready. . . . C. L. Cummins, president of the Cummins Engine Co. at Columbus, Ind., is driving the first Diesel-powered American passenger car, an Auburn phaeton sedan, from the Atlantic to the Pacific, expecting to make the 3000-mile journey at a fuel cost of less than $8. . . . Industrial employment in Detroit today stands at 97.1, compared with a high of 110.8 for the year on April 30. . . . The new Chevrolet is reputed to have cast iron brake drums and the new Buicks centrifuse drums. . . . Fisher Body is understood to have let out some Keller die work on 1936 jobs. . . . Chevrolet set a new all-time record in May for total volume of parts and accessories sales. . . . Kelsey-Hayes Wheel Corpn. is equipping a new foundry to cast wheels of new design for Ford, according to reliable reports.



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Be sure that the worms in your new products are precision ground. We can show you how to grind them.

PRATT & WHITNEY CO.
HARTFORD, CONNECTICUT

THIS WEEK IN WASHINGTON

Wagner-Connery labor disputes bill faces court test on constitutionality.

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Public and Congressional pressure force postponement of President's tax program until later in summer.

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Large steel tonnage will be required in navy and coast guard building programs.

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Passing of steel code is believed no reason for not continuing improved methods of gathering industry's statistics.

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Miss Perkins disagrees with Wagner bill regarding national labor policy in annual report of her department.

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BY L. W. MOFFETT
Resident Washington Editor, The Iron Age

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WASHINGTON, July 2. — With the Presidential signature expected momentarily, the Wagner-Connery labor disputes bill, American Federation of Labor-born, will become a law as industry prepares to attack it in the courts on constitutional grounds. . . . The Guffey coal nationalization bill, sponsored by the A. F. of L.'s "holding company," the United Mine Workers, about to be thrown into the legislative mill, faces a like test, if it is passed, and even if contemplated modification is effected. . . . Incidentally, this is one holding company that the Administration will not eliminate, and it may be added that an important section of the coal industry does not want it wiped out. . . . In return for anticipated benefits from the legislation a group of operators is prepared for further organized labor dictation. . . .

Strange as it may seem, further NRA legislation at the present session of a fagged Congress may not be thrust upon a fagged country, despite "demands" on the White House by organized labor to license industry. . . . After all, there may be a limit to demands from this source. . . . Moreover, 20-minute shifts in Governmental plans have become a fixed schedule, the unexpected has become expected, the expected unexpected. . . . Therefore, if the previous plan for NRA legislation at the present session of legislators of more or less ready-written legislation is listed with uncertainties, it is only another listing in this growing category. . . .

Besides, the Supreme Court Schechter decision has left the Administration hanging on the ropes. . . . And consult as they will, officials do not know just what can be done with the myriad of suggestions to resurrect the dead in the way of giving heart, blood and flesh to the skeletonized NRA. . . . The prevailing view is that, in the end, the Federal Trade Commission again will have its baby back, much to its joy. . . . This will mean a return to the old trade conference agreements, perhaps amplified somewhat, with NRA given the rather onerous, if not empty, task of handling labor practices where the new National Labor Board permits. . . .

As a shift is made in the share-the-wealth tax program, Congress is fretfully trying to reconcile itself to stay in session throughout the dog days of Washington's sweltering season, with three-day recesses as the House Committee on Ways and Means listens to angry, protesting victims. . . . Speaker Byrns predicts that the program will keep Congress in session for another two months. . . . Full consideration, so leaders say, will be given to the program by both branches. . . . Which is in contrast with the original plan to jam it through over the week-end last week. . . .

The President said the report that such a plan was proposed by him was made "out of whole cloth." . . . His conferees, however, had announced that that was the purpose, and Senator Harrison, chairman of the Finance Committee, quite heroically, took the blame upon himself for the "misunderstanding" and did not turn to the old dodge of passing the buck to the press. . . . A common trick when trial balloons are punctured. . . . In any event, reaction against a rush job was extremely strong, both from the country and

within Congress. . . . So, too, the Ways and Means Committee, originator of revenue legislation, was hostile to the proposal that the legislation be made a tail to the nuisance tax law, which was reenacted and was before the Senate when the President sent his stunning tax program to Congress. . . .

The shift is also attributed to another cause, perhaps the most important. . . . That is that the taxes as worked out, instead of raising an estimated $340,000,000 by levies on inheritances, higher graduated corporation income assessments and kited individual taxes in the brackets above $1,000,000, would not approach this figure. . . .

In some quarters it was estimated the taxes would not raise more than a mere $50,000,000. . . . Accordingly, the Treasury staff was put to the task of working out further proposals. . . . The corporation taxes, as laid out in the amendments which Senator Harrison had proposed prior to Congressional revolt, would be revised from the prevailing uniform level of 13¾ per cent on net income. . . . Beginning at 10 per cent on net income not in excess of $2,000, the levies would range up to 17½ per cent on income in excess of $20,000,000, with an increase of 1 per cent in each intermediate bracket. . . . The corporation taxes were estimated to raise $100,000,000, which was found to be highly optimistic in view of these days of little or no net income of that kind, to say nothing of discouraging recovery and encouraging further unemployment. . . .

It will be interesting to see what industry has to say on this proposal at the hearings, which at first were to be denied, in the name of "democracy," to the struggling tax-paying nation. . . . Even if the $340,000,000 estimated revenue proved correct, or was an underestimate, it would be a mere bagatelle when measured against the staggering and growing deficits, amounting to $3,500,000,000 in the fiscal year ended June 30, which are piling up, thanks to the wild orgy of tremendous Governmental spending. . . . Even agitators in Congress for the soak-the-rich tax plan well know that there will have to be an early halt—not in sight—in this heedless raid on the country's wealth or that there will have to be a program of severe taxation all the way from the small individual and business income up to the largest income. . . . In any case, increased taxes in the lower brackets are inevitable, though being kissed off until the political campaign is over. . . . In Congressional circles not antagonistic to the New Deal it is conceded that were it not for political expediency such a program would be offered. . . . That it is necessary, in the absence of actual repudiation of debts, if a breakdown of the country's financial system is to be avoided. . . . Inflation might stay the event, but would increase the velocity of the crash when it came. . . . Nor is there assurance that the revenue would be applied to the national debt. . . . Rather, there is a fear that it would only mean more waste. . . . The irrepressible Representative Patman, his bonus legislation smashed by the President, proposes to take advantage of the tax program to revive his bonus scheme and attach it as a rider to the bill, which would take some $2,000,000,000 of the generously estimated $340,000,000 return. . . .

The Bankhead farm tenant bill, passing the Senate by a vote of 45 to 32, and headed for passage in the House, unless sanity stops it, would have the Government "lend" on 60-year terms $1,000,000,000 to finance purchases of farms for tenant farmers. . . . The urban dweller, just as anxious for a home as the tenant farmer, and just as deserving, not only would be denied access to the Federal almoner, but would have to contribute to keep the farmer's home fires burning. . . . The social security legislation will tax industry to the tune of $3,000,000,000 annually . . . and so on, ad nauseam. . . .

At least some consolation must be taken by industry and the country in the fact that there will be no more Presidential messages sent to the present Congress . . . barring, of course, some now unforeseen reason for tacking on more "must" legislation. . . . This was decided upon after the President last week told Congress to pass a law saying the Government will not stand for suits by holders of gold clause bonds, that the doors of courts of justice are slammed in their face. . . . Why this delay in asking for repudiation of Government contracts is a matter of conjecture, inasmuch as the Supreme Court gold clause decisions came down early in the year. . . . Decisions which saved the face of the Administration by a narrow squeak. . . . The court said plaintiffs had not shown nor attempted to show losses from abrogation of the gold clause, but it also said Congress had no constitutional right to change the terms of a contract between the Federal Government and holders of its bonds. . . . Perhaps there was fear that suit might be brought on the basis of alleged damages. . . .

While the message hardly will increase confidence in the Government, it seems to be consistent with the idea of repudiation. . . . The legislation will be passed . . . and leaders in Congress say the reason for it was set forth fully by the President in his message. . . . That it is not an inflationary move by the route of further depreciating the purchasing power of the dollar. . . .

All in all, Washington—and the country—is in for a hot summer. . . .

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FHA Approves Beam Steel Floors

A ruling of the Federal Housing Administration makes acceptable for use in property otherwise eligible for mortgage insurance beam steel flooring to be used as an auxiliary for the replacement of under-floor electrical wiring duct systems. This method of floor construction is eligible, subject to the following limitations: No reduction in rating shall be made because of this type of construction when appropriately used and such acceptance is not to be construed as a general acceptance of this type of construction in all cases In order to qualify for an insured mortgage, each individual property will be considered on its own merits.

The method of beam steel flooring mentioned calls for panels made of a series of keystone-shaped strip steel cells, sometimes combined with steel plates welded to the upper or under side of the keystone cells. These panels act as secondary structural floor units. Steel plates may act as a subfloor or the panels may be reversed, the plates acting as a ceiling. Gages of steel are from 18 to 10, depending on the span and the load to be carried. Spaces between cells may be filled with concrete, so as to provide a subfloor. Structural wiring and pipe may be run through the steel cells and the walls of the cell may be punctured to permit the passage of pipe or wiring in a transverse direction.

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Naval Vessel Steel Requirements 31,000 Tons

Approximately 18,600 tons of plates, 9300 tons of shapes and 3100 tons of bars, a total of 31,000 tons, will be required for the 13 vessels on which bids will be asked of private yards by the Navy Department on Aug. 7. The ships are part of the 24-shipbuilding program carried in the naval appropriation bill enacted last week. The 13 vessels include one light cruiser, one aircraft carrier, eight torpedo boat destroyers and three submarines. The tonnage requirements are estimated as follows: light cruiser, 4200 tons of plates, 2100 tons of shapes, 700 tons of bars; aircraft carrier, 9000 tons of plates, 4500 tons of shapes, 1500 tons of bars; eight torpedo boat destroyers, 4320 tons of plates, 2160 tons of shapes, 720 tons of bars; three submarines, 1080 tons of

plates, 540 tons of shapes and 180 tons of bars.

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Coast Guard Asks Large Fund for New Vessels

Application has been made by the United States Coast Guard for $27,013,000 from the public works relief fund to purchase 38 lots of vessels as well as propulsive and other machinery for these craft. There is also an application for purchasing a number of gasoline motors. The project is entirely a manufacturing one, designed to provide work for mechanics and boat builders now on relief rolls and at the same time give the Coast Guard a faster and more modern fleet. The jobs and specifications would be advertised in all cities with shipbuilding and marine equipment plant.

The Coast Guard also has asked for allotments aggregating $5,399,746, covering 36 projects in Alaska and 18 States. Most of the projects call for reconstructing and reconditioning of shore stations and facilities and the replacing of submarine cables and telephone lines. The largest single projects involves $1,065,000 for replacing buildings at the Coast Guard depot at Curtis Bay (Baltimore), Md. The replacements consist of blacksmith shop, foundry, woodmill, pattern shop, bulkheading, barracks, officers' quarters, offices, storehouse, ordnance building, fire, water, sewer and electric systems and roads.

Another application by the Coast Guard is for $2,280,745 to cover 44 projects in 25 States to include reconstructing and reconditioning of shore stations and the replacement of submarine and underground cables and telephone lines. The largest project calls for $511,460 for reconstructing and reconditioning shore facilities and rebuilding 23 shore stations in St. Clair and 18 other counties in Michigan.

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NRA Fact Finding Board Set Up

At the request of President Roosevelt, Acting NRA Administrator James L. O'Neill has established an impartial committee to accumulate, check, and report accurate information concerning the extent to which changes occur in the maintenance of labor standards or fair trade practice provisions following the abolition of codes.

The members of the committee are: Major General Amos A. Fries, impartial chairman; Assistant Secretary of Commerce John Dickinson, representing the Department of Commerce; Dr. Isador Lubin, Commissioner of Labor Statistics, representing the Department of Labor; John W. Upp, NRA division administrator, and Father Francis J. Haas, member of the Labor Advisory Board.

In addition to supervising the collection of data, the impartial committee will coordinate the work with the informational services of the Departments of Commerce and Labor and with similar services maintained by organizations of employers or employees.

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Business Men Quit Advisory Council

Edward L. Ryerson, Jr., president, Joseph T. Ryerson & Sons, Inc., Chicago; Harold C. Smith, president, Illinois Tools Works, Chicago, and Howard Heinz, president, H. J. Heinz Co., Pittsburgh, resigned last week as members of the Roper Business Advisory Council, an organization of about 45 business men set up by Secretary of Commerce Roper to present the viewpoint of business to the Administration. In denying that the resignations were due to dissension over Government policies, Department of Commerce officials declared that the situation was "entirely amicable" and that successors to the members who resigned will be named soon.

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Large Public Works Funds for New York

Works relief grants aggregating $16,541,794 for four New York City projects were approved by President Roosevelt last week on recommendation of the Advisory Committee on Allotments. The largest fund for New York consists of $11,360,250 for construction of a sewage disposal plant on Ward's Island. A grant of $2,475,000 was made for development of a college plant to be known as the Brooklyn College, while another for $1,568,863 was made for the construction of a four-story and basement fireproof high school building with athletic field and field house at Jamaica Avenue and Elderts Lane in the boroughs of Brooklyn and Queens. The other grant is for $1,137,681 for the construction and equipping of a three-story and basement fireproof high school building at Springfield, Queens. The sewage disposal plant on Ward's Island will consist of a treatment plant, including pump houses, administration building, heating plant, north seawall and three self-propelled sludge boats, each of 1600 tons capacity.

A grant of $473,500 was made to the Department of Public Works of Chicago, to aid in the construction of a vertical lift bridge with approaches over Calumet River to Torrence.

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Britain Encourages Plant Modernization

The British Parliament has just enacted a provision in its finance bill which places the Government definitely on record as encouraging industrial schemes for the elimination of redundant plant. In effect the provision calls for deduction of taxes on trades when the money is used for the purchase of new equipment, and certification of the scheme is made by the Board of Trade.

According to reports received from foreign representatives of the Department of Commerce and the Department of State, the board shall certify a scheme under the income tax act if the board is satisfied

(a) That the primary object of the scheme is the elimination of redundant works or machinery or plant from use in an industry in the United Kingdom; and

(b) That the scheme is in the national interest and in the interest of the said industry as a whole; and

(c) That such number of persons engaged in the said industry as are substantially representative of the industry are liable to pay contributions in furtherance of the primary object of the scheme by agreement between them and the body of persons carrying out the scheme.

In a statement issued by W. H. Myer, acting chief, Machinery Division, Bureau of Foreign and Domestic Commerce, it was pointed out that British industrialists are said to fully appreciate the limited application of the concession and to realize that it will not benefit individual concerns or small groups of an industry acting alone. He added that they welcome it as legalizing for the first time the setting off of a capita charge against revenue.

From sources outside of the Government, attention has been directed to the fact that proposals also have been made by American industrialists for deductions of corporate taxes when expended for durable goods. These proposals have met with opposition and have made no headway. On the contrary, the pending Administration tax program calls for a sharp increase in corporate taxes on large concerns. Complaint also has been made that the American Government's program, unlike that of the British Government, further discourages capital goods investment, as reflected in its $4,880,000,000 works relief policy which calls mainly for employment of direct labor rather than purchase of materials and the employment of indirect labor in their manufacture.

Improved Statistics on Flat-Rolled Steel Production Suggested

WASHINGTON, July 2.—Codification of the iron and steel industry is universally recognized as having developed beneficial results. Evidence of this fact lies in the determination of the industry voluntarily to continue practices that were either built up under its code or were stimulated and made effective by it. Maintenance of wage and hour standards clearly is giving a stability to the market that it might well be doubted would exist otherwise. Establishing and adhering to fixed extras assure fair competition and therefore a return on investment which in the pre-code period were notably lacking.

This is not to say this practice has always assured profit. Without adequate volume the industry cannot operate profitably, no matter how sound its practices may be. Nevertheless such practices have either netted returns or pared down losses, where losses were sustained.

Now that the code has been abandoned as the result of the Supreme Court decision in the Schechter poultry case, the industry has turned to a voluntary effort not only to adhere to code principles so far as that is legally permissible but is seeking further to improve practices, both commercial and technical. Its work in these directions, of course, was a continuing task for many years prior to codification. But it is obvious that under the impetus of the code it made progress in the field of fair trade practices and informational service faster than it would have otherwise made because one of the fundamental purposes of the code was to develop these things. With this work laid as a background it is expected that it will be a strong force in its further development.

To this end the suggestion has been made that the industry could profitably further improve its production statistics for the benefit of both the trade itself and its consumers. It has already made important strides in this direction as is exemplified by the much improved presentation of production figures made by the American Iron and Steel Institute in its statistical bulletin No. 3, 1934.

Recognizing the merit of this work, the view prevails in well informed circles that additional improvement that should be given early consideration relates to figures on so-called black plate for tinning and other purposes. At present "black plate" both "for tinning" and "all other" is segregated from "sheets and strip." The point is made that "tin plate" is "tinned sheets" and that there is no more apparent reason for segregating black plate from other sheets and strips than there would be for segregating black plate for galvanizing or black sheets for galvanizing. Properly, it is maintained, the production of galvanized sheets is shown separately, merely representing the sheets which were galvanized but which were, nevertheless, black sheets before they were galvanized. Similarly, the production of tin plate and terns plate is shown separately and this reveals the production of these products which were black sheets or strips, depending upon the gage and size before they were tinned.

Tin plates (tinned sheets) are almost entirely produced from a cold-rolled base material. It is explained that in the uniform classification of flat-rolled carbon steel products, adopted by the American Iron and Steel Institute, cold-rolled products are as follows:

Cold-Rolled Strip

All thicknesses, 12 in. wide and narrower.

0.029-in. thick and thicker, over 12 in. to 23 15/16 in. wide inclusive.

Cold-Rolled Sheets

0.028 in. thick and thinner over 12 in. to 23 15/16 in. wide inclusive.

All thicknesses 24 in. wide and wider.

Thus, it is pointed out, the great preponderance of material for use in the production of tin plate is under the foregoing definition, "cold-rolled sheets," although some would be cold-rolled strip when it left the rolling operation 0.029-in. thick or thicker and between 12 in. and 24 in. wide, and 12 in. wide and narrower in all thicknesses. The small amount of material used in the production of tin plate, or terne plate, which is not officially "cold-rolled" would automatically be considered as hot-rolled annealed sheets in thicknesses under 0.059 in. and thinner over 6 in. wide, which would take care of practically all of such material, although whatever material not "cold-rolled" used for tin plate, or terne plate, was over 0.059 in. thick would be hot-rolled sheets or hot-rolled strip, depending upon the gage and thickness.

In statistical bulletin No. 3, 1934, issued by the American Iron and Steel Institute under the heading "Production of All Kinds of Finished Rolled Iron and Steel in 1934 by Products," the total production of sheets is shown as 3,202,605 gross tons and that of black plate as 1,735,431 gross tons. Of the latter, it is maintained, at least 90 per cent, or approximately 1,560,000 gross tons, probably left the rolling operation as a cold-rolled product, 0.028 in. thick and thinner in the widths over 12 in., and therefore consisted of "cold-rolled sheets." This 1,560,000 tons of cold-rolled sheets for tinning added to the production of sheets for all other purposes, 3,202,605 tons, it is pointed out, would seem to give the proper figure for the production of uncoated sheets, 4,762,605 tons, which would properly indicate the rolled production of this form intended for all purposes, including galvanizing, tinning, etc. After deducting this 1,560,000 tons of sheets intended for tinning from the reported figure of 1,735,431 tons of black plate, there would remain approximately 175,000 gross tons to be added to the figure for strip steel and perhaps a small amount to be further added to sheets to take care of the non-cold-rolled material which left the rolling operation over 24 in. wide and under 0.059 in. thick.

In this manner, it is declared, the rolling mill production of what are formatively considered sheets and strip would be more accurately presented. Anyone interested in learning the amount of this material which was subsequently coated and sold as tin plate, terne plate, long terne sheets, or galvanized sheets, will find the figures for the production of these coated products clearly presented outside of the figures for finished rolled steel production.

It is held to appear of considerable significance that the production of black sheets, that is, uncoated sheets, in the rolling mills amounted not to 3,202,605 gross tons but actually to approximately 4,762,605, and therefore this class constitutes the most important separate form of rolled steel, greatly exceeding the 3,289,431 gross tons of merchant and concrete bars which, presumably, include as merchant bars a considerable quantity of small shapes. It has been pointed out as also interesting that on this basis the rolling mill production of what are formatively considered sheets represented approximately 25 per cent of the total rolling mill production of 18,969,506 gross tons.

Miss Perkins Disagrees With Wagner Bill Regarding National Labor Policy

WASHINGTON, July 2. — So sharp are differences in the New Deal - supported Wagner-Connery labor disputes bill and the annual report for the fiscal year 1934 of Secretary of Labor Frances Perkins that they disclose a serious conflict within the Administration over a labor policy. The confusion was increased by reason of the fact that the report was released almost immediately after passage by both branches of Congress of the Wagner-Connery measure.

The contrast of policy between the bill and the report is marked on several fundamental points. Indicative of this fact is the definite Government authority set up in the Wagner-Connery bill to enforce so-called fair trade practices on employers in connection with the guarantee to labor of the right of collective bargaining as against Secretary Perkins' declaration that "labor policy in a democracy is not a program conceived by the Government."

Industry, in its vigorous opposition to the Wagner-Connery bill, has taken precisely the same attitude as that taken by Miss Perkins. Yet she has supported the Wagner-Connery bill although unsuccessful in her effort to have the National Labor Board, its administrative body, made a part of the Department of Labor. Ostensibly, at least, the Federal board will have supervision over labor—that is, organized labor—in dealing with the relations between employer and employee. Labor is cleared by the bill of efforts at coercion, while employers are restrained from such tactics, yet the measure clearly makes labor as well as employers subordinate to the Federal authority.

Organized labor has made much about the right of collective bargaining. Such a right has not been challenged by responsible industry, although the latter has attacked coercive means. Organized labor has demanded that this right be enforced by the Government. The Wagner-Connery bill as one of its cardinal principles gives the power of such enforcement to the Government. Miss Perkins treats the matter of such Government power lightly, for she expresses the view that labor policy in a democracy is "a program of action which the people who earn their living as wage earners and those who employ them in a profit-making enterprise must work out together in a society which develops naturally out of the work that they do and the life they lead." It would be difficult to make a better argument for the employee representation plan when sincerely applied.

The simple role Miss Perkins suggests for the Government is set forth in her declaration that "the function of the Government is to serve as a stimulating agent to facilitate the formation of such a policy, which will be just and fair to all the people and in the line of human progress."

Miss Perkins also would lay obligations on labor as well as industry, and her conception of such obligations is interesting in view of the "rights" given labor by the "Wagner-Connery bill.

"If labor's rights are defined by law and Government," she says, "then certain obligations will, of course, be expected of wage earners, and it is for the public interest that those obligations should be defined by labor itself and that such discipline as is necessary should be self-imposed and not imposed from without."

Whatever may be done under its administration, the fact remains that the Wagner-Connery bill would leave to the National Labor Board the working out of rights of labor. Thus the obligations or labor would not be self-imposed.

Miss Perkins in the course of her recommendations says that "The Government ought to do everything in its power to establish minimum basic standards for labor below which competition should not be permitted to force standards of health, wages and hours."

The great bulk of industry today has imposed that principle on itself, and readily adopted it under codification. It was not until the recovery act was proposed that organized labor would assent to the fixing of minimum wages.

If fairly executed, it is evident that industry would welcome other recommendations made by Miss Perkins. Some of them are as follows:

"That the Government ought to make such arrangements and use its influence to bring about arrangements which will make possible peaceful settlement of controversies and relieve labor of the necessity of resorting to strikes in order to secure equitable conditions and the right to be heard.

"That the ideal of Government should be through legislation and through cooperation between employers and workers to make every job the best that the human mind can devise as to physical conditions, human relations and wages.

"That Government should encourage such organization and development of wage earners as will give status and stability to labor as a recognized important group of citizens having a contribution to make to economic and political thought and to the cultural life of the community.

"That Government ought to arrange that labor play its part in the study and development of any economic policies for the future of the United States."

In speaking of the National Steel Labor Relations Board, Miss Perkins said that its appointment "and the concurrence of both the employers and workers in accepting the good offices of the board and the general terms of its powers, had the effect of preventing a strike and of making possible a tribunal, composed of three impartial persons, before which claims of discrimination on account of union activities could be heard and adjusted, and through which negotiations looking to various adjustments of working conditions might take place."

Barrel Makers Will Issue Publication

STEEL BARREL MANUFACTURERS COUNCIL, Cleveland, will bring out a monthly publication entitled "The Drummer," the first issue of which will appear late in July. This will be devoted to presenting the advantages of the use of steel drums as containers for lubricating oil and alcohol. Marketing of these products in small tin cans recently has tended to reduce the demand for steel drums for that purpose.

The A. P. Green Fire Brick Co., Mexico, Mo., has issued a silver anniversary booklet which tells with words and pictures a story of the company's progress over the past quarter century. This booklet is being distributed to all A. P. Green customers and friends. A. P. Green, president of the company, was presented with a silver loving cup in honor of the occasion.

OBITUARY

HERBERT E. STORRS, for 23 years purchasing agent of the Lodge & Shipley Machine Tool Co., Cincinnati, died of a heart ailment at his home in Cincinnati on June 27. Since leaving the machine tool company three years ago, Mr. Storrs had been district salesman for several out-of-town companies in the same industry. He was widely known in the machine tool business in Southern Ohio and Northern Kentucky.

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WILLIAM E. RANNEY, president and general manager of the Budd-Ranney Engineering Co., Columbus, Ohio, died at his home in that city on June 23, aged 61 years.

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FREDERICK N. CONNET, chief engineer of the Builders' Iron Foundry, Providence, R. I., died at his home in that city on June 18. In 1889 he was graduated from Stevens Institute as a mechanical engineer. Known throughout the world for his invention of automatic registering devices, Mr. Connet also was famous for his hydraulic engineering.

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JAMES H. JONES, designer of the motor used in the first air mail flight between Garden City and Mineola, L. I., by EARL OVINGTON, and identified with automobile, motorcycle and other industries in an engineering capacity, died at his home in West Springfield, Mass., June 17. He was born in Ireland 63 years ago, and came to the United States in 1892.

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EDWARD GRANT CAUGHEY, research engineer for the Weirton Steel Co., died on June 22 in the Valley Hospital at Sewickley. Mr. Caughey was a graduate of Western University of Pennsylvania and Massachusetts Institute of Technology. He was 69 years old.

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JOHN E. VAN DOREN, machine tool manufacturers' agent and for a number of years with headquarters at the Vandyck Churchill Co., New York, died at his home in Summit, N. J., on June 18, aged 47 years. Among the companies he represented were the Geometric Tool Co., New Haven, Conn., Armstrong Blum Mfg. Co., Chicago, and the Etto Co., Brooklyn, N. Y.

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FRANK OREN WELLS, tap and die manufacturer, died at his home in Greenfield, Mass., on June 23, after a short illness. He was born in Shelburn Falls, Mass., Jan. 6, 1855, early in life learned the machinist trade, and at the age of 21 with his father and brother formed the firm of Wells Brothers. He was a dominating factor in the organization of the Greenfield Tap & Die Corpn. in 1912, of which he was president until 1919, and remained with the corporation in an official capacity until about 1920.

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CHARLES F. SWIGERT, president of the Pacific Bridge Corpn. and the Transbay Construction Co., Portland, Ore., died June 23, in San Francisco. He was a native of Ohio.

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W. T. SNYDER, manager of industrial relations department, National Tube Co., died at McKeesport, Pa., on June 18. He was 55 years old. A native of Alpsville, Pa., Mr. Snyder had been associated with the National Tube Co. for about 40 years, having held the positions of electrical superintendent, superintendent of power and construction superintendent, prior to his connection in the industrial relations department. He formerly had been a president of the Association of Iron and Steel Electrical Engineers.

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FRANK H. STREINE, designer and builder of metal-finishing machinery and manager of the finishing machinery division of Mackintosh Hemphill Co., Pittsburgh, died at Zanesville, Ohio, June 15, from injuries received in an automobile accident the same day. Mr. Streine was vice-president and general manager of the Streine Tool & Mfg. Co., New Bremen, Ohio, for many years. Recently he became connected with Mackintosh-Hemphill.

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EMIL ERICK LINDGREN, former Mayor of Batavia, Ill., and for 15 years owner of the Lingren Foundry, died recently at the age of 66 years. Mr. Lindgren was born in Sweden and came to this country at an early age. He supervised the management of the Des Plaines Foundry, Des Plaines, Ill., until he established his own plant.

TRADE NOTES

Link-Belt Co., Chicago, earned approximately $415,000 in the first four months of 1935. A quarterly dividend of 20c. a share on the common stock has been voted. This compares with 15c. paid in the preceding quarter and 10c. paid a year ago.

Austin-Hastings Co., Inc., Cambridge, Mass., has established a sheet metal department, having taken over staff of Harry L. Doten & Sons, Boston, who are liquidating. Harry L. Doten will supervise new department.

Shallcross Controls, Inc., Milwaukee, maker of automatic controls for combustion, pressure, liquid level and miscellaneous applications, has named the following representatives: General Instruments & Control Co., 205 West Wacker Drive, Chicago; W. O. Taylor & Co., Ltd., Canada Cement Building, Montreal; Kennedy B. Whitley, 332 West Seventh Street, Erie, Pa.; Walter V. Gearhart Co., Volunteer Building, Atlanta, Ga.; Morrissey-Kantenberger Co., Allen Building, Dallas, Tex.; P. C. Hackman, 514 Main Street, Cincinnati; James F. Strachen, 1014 Oxford Street, Berkeley, Cal.; and J. R. Fortune & Son, 604 Fisher Building, Detroit.

Buell Engineering Co., Inc., 70 Pine Street, New York, has been formed to manufacture Buttner drying systems of the rotary, turbo, and fine-film types, and Van Tongeren system of dust extraction for fly-ash from stack discharge as well as for collection of dust from chemical and cement plants. Burners and pulverizing sets for power and industrial grinding are also to be made. Units will be manufactured by Struthers-Wells-Titusville group which is associated with the new company. It is also linked with Buell Combustion Co., Ltd., England.

United States Rubber Products, Inc., Mechanical Goods Division, has removed its New Orleans Branch to 440 Canal Street.

Timken Steel & Tube Co., Canton, Ohio, has appointed Edgcomb Steel Co., Philadelphia, as agent of the complete line of Timken steel products in Philadelphia district. Edgcomb company maintains warehouse facilities in Philadelphia, on D Street below Erie Avenue.

General Machinery Corpn., 120 Federal Street, Boston, has been appointed to represent Erie Foundry Co., Erie, Pa., in Maine, New Hampshire, Vermont, Massachusetts and Rhode Island, and will handle Erie line of forge shop equipment, including forging hammers steam drop hammers, board drop hammers and trimming presses, and Erie hydraulic presses and rubber mill machinery.

Andorr Iron Works, New York, manufacturer of ornamental iron products, has moved from 413 East Twenty-fifth Street to 300 East Sixty-fourth Street. Arthur Bleich is president.

British Steel Output Is Approaching Record Proportions—Market Buoyant

LONDON, July 2 (*By Cable*).—The British market is confident and output is approaching record levels with no signs of slackening demand. Many plants are being modernized in order to reduce production costs and increase competitive power.

Pig iron output barely equals consumption. Two hematite furnaces are being relit at the end of July.

Steady demand for semi-finished steel is necessitating a heavy production rate. Plates are in moderate demand, but structural steel is active and better home demand for sheets is reported. Home and export demand for tubing is heavier and the United Kingdom apparently is little affected by the break-up in the International Tube cartel. Improvement in tin plate demand is maintained with order books heavy and output likely to remain at 55 per cent of capacity for some weeks. Business is better, notably with South American and Empire markets.

Continental iron and steel markets are dull and mills are curtailing operations. Early improvement is unlikely pending conclusion of negotiations with England and in view of approaching summer holidays. In an effort to combat American and Japanese competition in Far East and South America, the International Wire Export Co. has authorized the Belgian group to quote 5s. gold below official prices.

The Belgian Hainaut Works has relighted an additional furnace as use of scrap is abandoned owing to high prices. Improvement in the French market is expected as Comptoir Siderurgique and the pig iron syndicates have been prolonged until Oct. 31.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9
Billets, open-hearth	£5 10s. to £5 15s.
Tin plate, per base box	*18s. 2d. to 19s.
Steel bars, open-hearth	£7 17½s.
Beams, open-hearth	£7 7½s.
Channels, open-hearth	£7 12½s.
Angles, open-hearth	£7 7½s.
Black sheets, No. 24 gage	£9 5s.
Galvanized sheets, No. 24 gage	£11 5s.

*To July 1: 18s. 5d. to 19s. 3d. thereafter.

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange

Billets, Thomas.	£2 7s.
Wire rods, No. 5 B.W.G.	£4 10s.
Steel bars, merchant	£3 5s.
Sheet bars	£2 8s.
Plate, ¼ in. and up	£4
Plate, 3/16 in. and 5 mm.	£4 2s. 6d.
Sheets, ⅛ in.	£4 7s. 6d.
Beams, Thomas.	£3 2s. 6d.
Angles (Basic)	£3 2s. 6d.
Hoops and strip base	£4 2s. 6d.
Wire, plain, No. 8	£5 7s. 6d.
Wire nails	£5 15s.
Wire, barbed, 4 pt. No. 10 B.W.G.	£8 15s.

Hand Grinder Features Pencil-Like Grip

FEATURES of weight, so light that a portable grinder can be handled as a pencil, are claimed for a new deluxe hand-ee grinder built by Chicago Wheel & Mfg. Co., Chicago. The tool is 6 in. long and 1⅝-in. diameter. Its weight is 15 oz., complete. Speed 25.000 r.p.m., normal 18.000 r.p.m. The method of handling is illustrated below. Aluminated duraluminum is employed in the fully-insulated body of the tool and molded Bakelite parts are used as bearing retainers and for end caps. There are no obstructions on the housing. A new-type radial commutator is employed and a patented, S-type, built-in switch has sliding phosphor bronze contacts. It is claimed that the factor of heat trouble is eliminated by a new type of fan mounting. Hardened steel cutters may be used. Sanding operations are possible and convenient through the use of a special sanding drum.

Foundrymen Issue Cast Metals Book

A CAST METALS handbook, which is devoted exclusively to data on cast materials, is now being published by the American Foundrymen's Association. The purpose of the book is to give metal users dependable working data on the properties and performance of cast metals and to bring existing data on castings up to date. The three main sections of the handbook are recommendations to designers of castings; recommendations to buyers of castings, and cast iron, malleable iron, cast steel and non-ferrous alloys as engineering materials.

Youngstown Adopts Vacations with Pay

THE Youngstown Sheet & Tube Co., Youngstown, has inaugurated a plan of vacations with pay for all workers. Every employee who has been in the company's service for 10 years or more will receive a week's vacation with pay. Every man with more than five and less than 10 years' service will receive one-fifty-second of the time he worked in 1934, paid at his regular daily rate. The paid vacations will benefit 6500 to 7000 men and cost the company from $125,000 to $150,000.

Central Iron & Steel Co., Harrisburg, Pa., has introduced an "All-Way-Grip" floor plate, which is said to afford maximum traction in every conceivable direction and permit of matching of patterns on all sides and ends thereby affording absolute minimum wastage in shearing. With their other patterns this gives the company complete coverage in the steel flooring field irrespective of the use intended.

▲▲▲ Capital Goods Activity

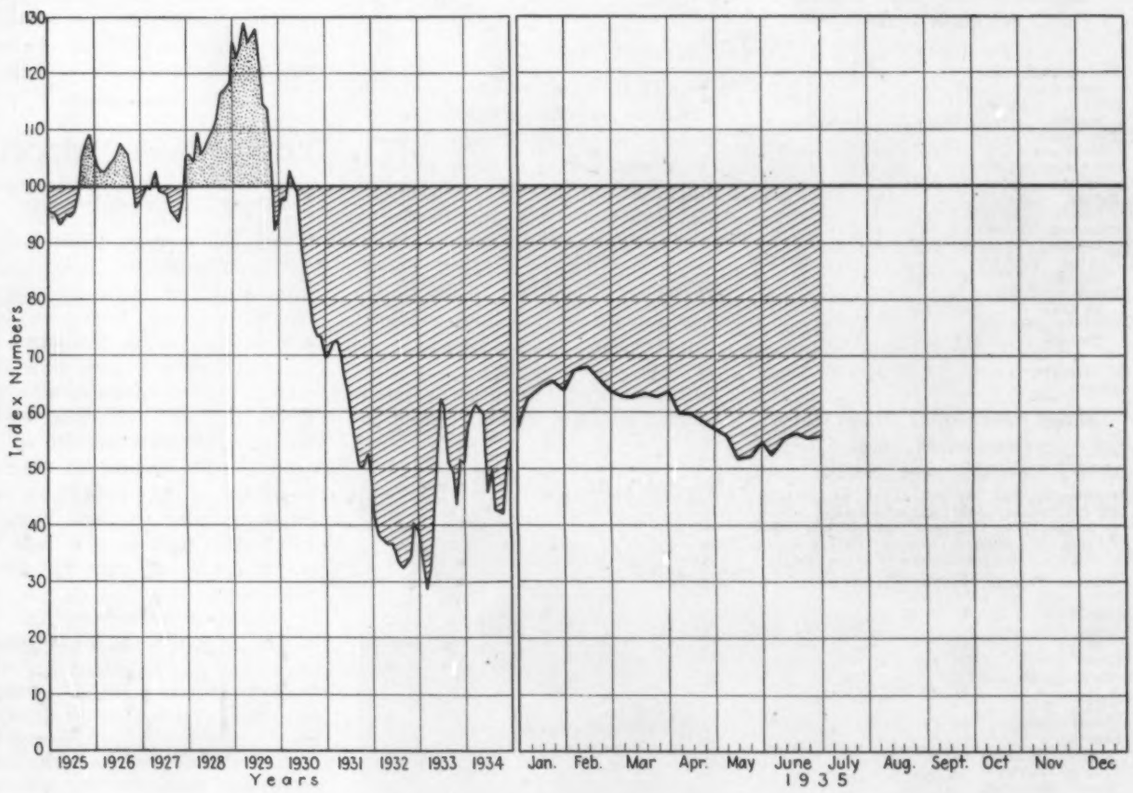
CAPITAL goods have maintained a fairly steady rate, with only minor weekly variations, during the month of June, according to THE IRON AGE index. The index number for last week shows a slight gain over the figure for the preceding week. A downward revision in the latter figure, however, was necessitated by a sharp drop in one of the component series, the index of productive activity in the Pittsburgh district. Capital goods activity during June was at a distinctly higher rate than in May, but lower than in any of the earlier months of 1935 and below the average rate of activity in June, 1934.

The Iron Age Weekly Index Numbers of Capital Goods Activity

(1925-27 Average = 100)

Last week (est.)	55.7
Preceding week (rev.)	55.2
Same week last month	54.5
Same week 1934	58.3
Same week 1933	59.2
Same week 1932	36.6
Same week 1931	64.1
Same week 1930	97.7
Same week 1929	129.0

The average rate of activity for the first half of 1935, however, has been slightly in excess of that during the first half of 1934. THE IRON AGE cumulative index shows for the first 26 weeks of the current year an indicated total production equivalent to 15.6 weeks at the average rate prevailing during the three years from 1925 to 1927, as compared with 15.2 weeks during the same period of 1934,



The Iron Age Index of Capital Goods Activity. The years 1925 to 1934 are plotted by months, the current year by weeks.

Maintains Steady Pace ▲▲▲

9.9 weeks in 1933, 10.3 weeks in 1932 and 18.2 weeks in 1931.

Residential Construction Gains

One of the most encouraging factors contributing to recent improvement in the capital goods industries has been a sharp revival in residential construction from the low levels of the past two years. As indicated in the chart at the bottom of the page, residential contract awards, measured in square feet, have advanced substantially during the past four months, and there is now more new building under way than at any time since the latter part of 1931.

An important factor contributing to the recent upturn is the fact that the index of rental charges, after declining almost uninterruptedly from 1925 to the end of 1933, has moved steadily upward during the past year and a half. This index has advanced more than 11 per cent above the low point in January, 1934, and is now about 31 per cent below the 1925-27 average.

Construction costs declined steadily after the spring of 1930 and reached a low point nearly 27 per cent below the 1925-27 average in the summer of 1932, at which time the construction cost index was nearly on a parity with the rental index. Since that time there has been a substantial rise in the construction cost index, which advanced to within a few points of the predepression level in the winter of last year. The small decline in construction costs occurring since that time, coupled with the continued rise in rents, has again brought a closer relationship between these two curves.

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Volume of Residential Building Compared with Construction Costs and Rentals.

Sources of data: Residential building F. W. Dodge reports of contract awards; Rental index: National Industrial Conference Board; Construction cost index: *Engineering News Record.*

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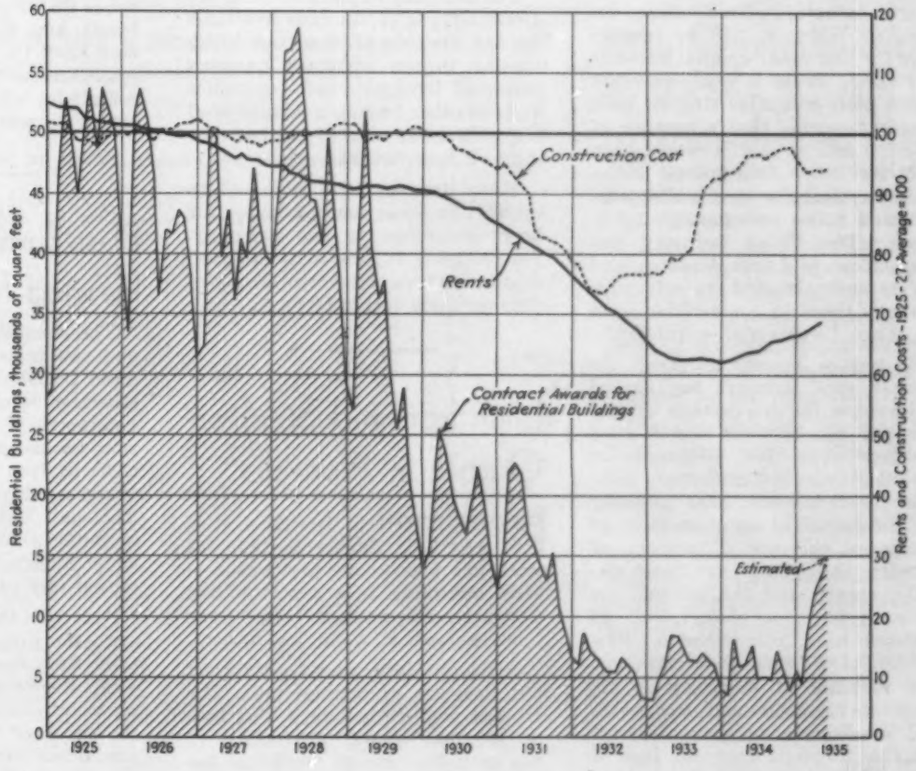


German Steel Exports Still Rising—Increase in Cartel Quota Likely

HAMBURG, June 22 (*By Special Correspondence.* — The German export movement in steel continues to show improvement. Monthly exports this year have been as follows: January, 182,000 tons; February, 202,300 tons; March, 253,300 tons; April, 262,000 tons; and May, probably more than 280,000 tons. The industry's program to raise the total figure to about 325,000 tons will probably be carried through.

The German industry has been given higher allotments and is accepting barter contracts for a part of the total business, but the present allotments still are considered inadequate. Orders are now heavier than allotments and virtually all calls for wire rods and many for bars and hoops have been turned down during the past two weeks.

It is expected, however, that this situation will be changed soon and that higher allotments on a number of products will be granted.

The Polish steel industry has established an export office for the entire industry. This office, located at Warsaw, will be responsible for the total export business of Poland, which is now exceeding 27,000 tons monthly. It has been already reported that a number of products will be sold in cooperation with the other Continental countries, particularly steel rails, wire rods and tubes and soon probably plates. The Polish industry has sales offices in Latin America and has recently started to sell wire products there in competition with the other Continental countries.

To reduce imports of scrap the German steel industry has agreed to increase the percentage of pig iron per ton of open-hearth steel produced from 192 kilograms to 225 kilograms. After further technical improvements, this quantity may be raised by another 30 to 40 kilograms per ton. Imports of foundry and other iron have virtually ceased and the present imports of pig iron consist only of charcoal iron from Sweden. Production of charcoal iron has been also resumed in Germany in the Siegerlan district, but output is still inadequate to meet demand. All the Swedish charcoal iron is obtained by barter.

Heavy demand for motor cars continues in Germany. Leading manufacturers are sold up for the next four or five months. Registration of cars in May was 43 per cent ahead of May, 1934, and 110 per cent above May, 1933. Only 43 per cent of all sales are now on installment, compared with 48.5 per cent last year and 57 per cent two years ago.

Continental Entering Beer Can Field

ACCORDING to an announcement by the Continental Can Co., Inc., New York, machine shops of the company are now busy building machinery for the manufacture of tin cans for beer. The company has been working on the development of a tin container for beer over the past two years, during which period experimental packs have been made in various breweries. Based upon the success of these experiments, the company is pushing the development as rapidly as possible.

The company expects to have two distinct types of tin cans available for the packing of beer, one being similar to the standard packer's can used for fruits and vegetables and the other having a cone shaped top with a cap similar to that now used on beer bottles.

Many brewers have indicated an interest in these new packages for beer, according to the company. The company expects to be equipped to manufacture these cans on a production basis within 60 days.

High Iron and Steel Output in Australia

PRODUCTION of iron and steel in Australia during the current year has broken all previous records, according to a report to the Commerce Department from Trade Commissioner E. C. Squire, Sydney.

Although last year's output of the largest producing unit, the Broken Hill Proprietary Co., was an all-time record, production of pig iron for the 48 weeks of the company's present trading year (May 14, 1934, to April 14, 1935) totaled 462,324 tons, against 346,752 tons for the year ended May 31, 1934, while production of ingot steel totaled 478,985 tons, against 414,242 tons.

A feature of production in recent months has been the increased output of what are "finished products" as far as these works are concerned, namely, nails, beams, bars, plates and rods.

A noteworthy feature of Australia's iron and steel industry this year has been the large increase in exports. During the first quarter there were shipped from the Broken Hill company's works at Newcastle 20,339 net tons of iron and steel compared with 3067 tons in the January-March period of 1934.

Bethlehem Refunds $55,000,000 Bonds

THE Bethlehem Steel Corpn. on July 2 offered $55,000,000 in consolidated mortgage 25-year sinking fund 4¼ per cent bonds, due on July 1, 1960. This is said to be the largest industrial bond issue to be offered since the passage of the securities act of 1933.

Proceeds from the sale of the bonds will be used to retire $29,008,000 of Midvale Steel & Ordnance Co. 25-year sinking fund gold bonds and $22,082,000 of Bethlehem Steel Co. purchase money and improvement mortgage bonds. Any remainder will be used for general corporate purposes.

Blast Furnace Meeting Planned for Chicago

The committee on blast furnaces and raw materials of the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers is arranging for a session on the subject of "Beneficiation: of Iron Ores, of Fluxes, and of the Air-blast," at the time of the National Metal Congress in Chicago next October. This session will be on Tuesday morning, Oct. 1, the second day of the Metal Congress.

Papers on the beneficiation of iron ores, the preparation of blast furnace flux stone, and on reducing waste due to nitrogen in the atmospheric air-blast are in preparation; the titles of these papers will be announced later.

Blast furnace men, whether members of A.I.M.E. or not, are cordially invited to attend this meeting.

June Pig Iron Output Off 7.1 Per Cent

PRODUCTION of coke pig iron in June totaled 1,552,514 gross tons, compared with 1,727,095 tons in May. The daily rate in June, at 51,750 tons, decreased 7.1 per cent from the May rate of 55,713 tons. Production for the first six months this year, at 9,799,000 tons, compares with 9,798,313 tons in the corresponding period last year.

There were 91 furnaces in blast on July 1, making iron at the rate of 49,180 tons a day, against 97 on June 1, making iron at the rate of 54,465 tons a day. Eight furnaces were blown out or banked during the month and two were put in operation. The Steel Corporation put one furnace in and took six off blast, independent steel companies took two off blast and one merchant furnace was blown in.

Among the furnaces blown out or banked are the following: One Monongahela, National Tube Co.; one South Chicago and one Gary, Illinois Steel Co.; three Ensley, Tennessee Coal, Iron & Railroad Co.; one Aliquippa, Jones & Laughlin Steel Corpn., and one Riverside furnace of the Wheeling Steel Corpn.

Furnaces blown in included a Mingo furnace of the Carnegie Steel Co. and the Anna furnace of the Struthers Iron & Steel Co.

Production by Districts and Coke Furnaces in Blast

Furnaces	Production (Gross Tons) June (30 Days)	Production (Gross Tons) May (31 Days)	July 1 Number in Blast	July 1 Operating Rate, Tons a Day	June 1 Number in Blast	June 1 Operating Rate, Tons a Day
New York:						
Buffalo	94,019	115,647	6	3,135	6	3,730
Other New York and Mass.	5,667	5,850	1	190	1	190
Pennsylvania:						
Lehigh Valley	34,250	36,285	3	1,140	3	1,170
Schuylkill Valley	12,241	13,730	1	410	1	445
Susquehanna and Lebanon Valleys	13,880	11,765	1	465	1	380
Ferromanganese	....	....	0	....	0	....
Pittsburgh District	290,874	315,698	15	8,360	18	9,845
Ferro. and Spiegel	14,861	8,358	2	495	1	155
Shenango Valley	19,909	25,343	1	665	1	685
Western Pennsylvania	37,950	37,232	2	1,265	2	1,330
Ferro. and Spiegel	5,638	6,037	1	190	1	195
Maryland	69,806	60,157	3	2,325	3	1,940
Wheeling District	107,964	142,159	6	3,515	8	3,950
Ohio:						
Mahoning Valley	152,514	171,153	9	5,115	8	5,520
Central and Northern	161,314	173,767	10	5,375	10	5,605
Southern	27,346	38,197	2	910	2	1,195
Illinois and Indiana	304,499	361,153	13	9,360	15	10,700
Mich. and Minn	52,618	41,536	3	1,755	3	1,780
Colo., Mo. and Utah	19,971	21,379	2	665	2	690
The South:						
Virginia	....	....	0	....	0	....
Ferro. and Spiegel	2,920	3,146	1	95	1	100
Kentucky	24,290	12,897	2	810	2	665
Alabama	99,983	125,606	7	2,940	10	4,195
Tennessee	....	....	0	....	0	....
Total	1,552,514	1,727,095	91	49,180	97	54,465

Daily Average Production of Coke Pig Iron

Gross Tons

	1935	1934	1933	1932
January	47,656	39,201	18,348	31,380
February	57,448	45,131	19,798	33,251
March	57,098	52,243	17,484	31,201
April	55,449	57,561	20,787	28,430
May	55,713	65,900	28,621	25,276
June	51,750	64,338	42,166	20,935
½ year	54,138	54,134	24,536	28,412
July	.....	39,510	57,821	18,461
August	.....	34,012	59,142	17,115
September	.....	29,935	50,742	19,753
October	.....	30,679	43,754	20,300
November	.....	31,898	36,174	21,042
December	.....	33,149	38,131	17,615
Year	.....	43,592	36,199	23,733

Production of Coke Pig Iron and Ferromanganese

Gross Tons

	Pig Iron*		Ferromanganese†	
	1935	1934	1935	1934
January	1,477,336	1,215,226	10,048	11,703
February	1,608,552	1,263,673	12,288	10,818
March	1,770,028	1,619,534	17,762	17,605
April	1,663,475	1,726,851	18,302	15,418
May	1,727,095	2,042,896	17,541	10,001
June	1,552,514	1,930,133	12,961	10,007
½ year	9,799,000	9,798,313	88,902	75,642
July	.....	1,224,826	.....	10,188
August	.....	1,054,382	.....	8,733
September	.....	898,043	.....	7,100
October	.....	951,062	.....	9,330
November	.....	956,940	.....	8,134
December	.....	1,027,622	.....	4,563
Year	.....	15,911,188	.....	124,190

*These totals do not include charcoal pig iron. The 1933 production of this iron was 32,941 gross tons.
†Included in pig iron figures.

May Imports Swelled By Pig Iron Trade

WASHINGTON, July 2.—Showing the first returns since the Belgium-American reciprocal tariff went into effect on May 1, imports of iron and steel in May aggregated 47,719 gross tons, compared with 28,866 tons in April. The principal increase, however, was made in incoming shipments of pig iron, the duty on which was not changed by the agreement.

Pig iron imports in May were 23,174 tons, against 8247 tons in the preceding month. Structural shapes, on which the duty was reduced, made a sharp gain to 3686 tons in May, compared with 2228 tons in April. Imports of this product came chiefly from Belgium, followed by France.

Imports of merchant and other steel bars, on which the duties were reduced, increased in May to 2037 tons from 1407 tons in April.

For the first five months of the current year, imports of iron and steel totaled 149,683 tons, compared with 142,763 tons in the corresponding period of last year.

Current Metal Working Activity Statistically Shown

These Data Are Assembled By THE IRON AGE From Recognized Sources And Are Changed Regularly As More Recent Figures Are Made Available. Boldface Type Indicates Changes This Week

	May, 1935	April, 1935	May, 1934	Five Months, 1934	Five Months, 1935
Raw Materials:					
Lake ore consumption (gross tons)[a]	2,466,585	2,360,002	2,957,934	11,001,670	12,142,756
Coke production (net tons)[b]	**2,850,236**	2,736,723	3,255,069	14,538,372	14,362,399
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	1,727,095	1,663,475	2,042,896	7,868,180	8,246,486
Pig iron output—daily (gross tons)[c]	55,713	55,449	65,900	52,107	54,612
Castings:					
Malleable castings—production (net tons)[d]	**34,729**	42,035	37,165	185,701	204,349
Malleable castings—orders (net tons)[d]	**31,136**	37,394	32,639	183,148	194,560
Steel castings—production (net tons)[d]	.....	31,952	57,313	199,216	.....
Steel castings—orders (net tons)[d]	.....	28,233	46,831	232,013	.....
Steel Ingots:					
Steel ingot production—monthly (gross tons)[e]	2,602,054	2,606,311	3,352,788	13,166,381	13,615,360
Steel ingot production—daily (gross tons)[e]	96,372	100,243	124,177	101,280	104,734
Steel ingot production—per cent of capacity[e]	43.53	45.28	56.40	45.99	47.40
Employment in Steel Industry:					
Total employees[e]	**420,470**	424,623	449,362	419,207	419,750
Total payrolls (thousands of dollars)[e]	**46,494**	45,890	51,896	208,934	45,538
Average hours worked per week[e]	**33.9**	34.2	37.1	33.7	34.2
Finished Steel:					
Trackwork shipments (net tons)[e]	4,228	4,472	5,764	22,463	17,365
Sheet steel sales (net tons)[f]	149,725	168,093	246,315	1,070,789	1,016,028
Sheet steel production (net tons)[f]	191,507	209,219	256,537	1,049,793	1,082,584
Fabricated shape orders (net tons)[g]	**55,600**	91,228	78,608	200,160	377,386
Fabricated shape shipments (net tons)[g]	**79,336**	81,271	104,976	358,030	394,602
Fabricated plate orders (net tons)[d]	17,630	13,244	21,891	111,438	81,548
Reinforcing bar awards (net tons)[e]	12,080	30,490	12,035	89,570	97,770
U. S. Steel Corpn. shipments (tons)[h]	598,915	591,728	745,063	2,693,558	2,975,891
Ohio River steel shipments (net tons)[i]	78,106	57,825	73,361	252,714	328,028
Fabricated Products:					
Automobile production, U. S. and Canada[k]	385,486	501,837	350,616	1,475,965	1,996,399
Construction contracts, 37 Eastern States[l]	$126,718,600	$124,020,000	$134,363,700	$727,046,500	$548,681,100
Steel barrel shipments (number)[d]	554,102	610,848	489,186	3,129,765	2,531,234
Steel furniture shipments (dollars)[d]	**$1,214,163**	$1,122,987	$1,010,528	$4,791,172	$5,761,399
Steel boiler orders (sq. ft.)[d]	**640,824**	312,542	277,086	1,556,291	2,282,608
Locomotive orders (number)[m]	2	2	17	80	13
Freight car orders (number)[m]	2	600	517	22,166	1,432
Machine tool index[n]	73.3	65.6	45.9	†46.8	†67.1
Foundry equipment index[o]	100.7	113.2	66.5	†69.9	†94.4
Foreign Trade:					
Total iron and steel imports (gross tons)[p]	**47,719**	28,886	29,465	142,780	149,683
Imports of pig iron (gross tons)[p]	**23,174**	8,247	8,628	60,218	46,903
Imports of all rolled steel (gross tons)[p]	**18,905**	13,566	10,063	44,162	72,336
Total iron and steel exports (gross tons)[p]	.....	205,336	241,753	1,033,768	.....
Exports of all rolled steel (gross tons)[p]	.....	64,625	105,771	420,213	.....
Exports of finished steel (gross tons)[p]	.....	54,034	69,354	365,533	.....
Exports of scrap (gross tons)[p]	.....	131,731	132,725	595,733	.....
British Production:					
British pig iron production (gross tons)[r]	558,900	526,300	527,900	2,383,500	2,642,700
British steel ingot production (gross tons)[r]	853,300	808,700	780,000	3,749,800	4,031,200
Non-Ferrous Metals:					
Lead production (net tons)[s]	37,358	32,389	39,945	180,479	159,114
Lead shipments (net tons)[s]	32,341	40,922	29,485	150,168	168,441
Zinc production (net tons)[t]	34,597	35,334	30,944	158,848	175,310
Zinc shipments (net tons)[t]	35,652	38,460	35,589	159,679	185,690
Deliveries of tin (gross tons)[v]	3,950	5,825	4,110	18,600	23,775

*Preliminary. †Three Months' Average.

Sources of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] THE IRON AGE; [d] Bureau of the Census; [e] American Iron and Steel Institute; [f] National Association of Flat-Rolled Steel Manufacturers; [g] American Institute of Steel Construction; [h] United States Steel Corpn.; [i] United States Engineer, Pittsburgh; [k] When preliminary, from Automobile Manufacturers Association—Final figures from Bureau of the Census; [l] F. W. Dodge Corpn.; [m] *Railway Age;* [n] National Machine Tool Builders Association; [o] Foundry Equipment Manufacturers Association; [p] Department of Commerce; [r] British Iron and Steel Federation; [s] American Bureau of Metal Statistics; [t] American Zinc Institute, Inc.; [v] New York Commodities Exchange.

SUMMARY OF THIS WEEK'S BUSINESS

Pig Iron Output Off in June; Holiday Depresses Steel Rate

Average Ingot Rate for Week May Fall Below 30 Per Cent—Scrap Index Rises—Farmer Buying Power Best in Four Years

PIG IRON production in June was 1,552,514 tons, or 51,750 tons a day, compared with 1,727,095 tons, or 55,713 tons daily, in May. The decline in terms of daily rate was 7.1 per cent. Furnaces in blast on July 1 numbered 91, a loss of six since June 1. Pig iron output in the first six months of 1935 was 9,799,000 tons, or almost the same as for the corresponding period last year, when 9,798,313 tons was produced.

STEEL works operations this week have declined sharply because of suspensions on Independence Day, the only holiday of the year outside of Christmas on which there is 100 per cent cessation of production. Ingot output on the eve of the shutdown was 32 per cent of capacity, and since some producers will resume on a curtailed basis on Friday while others will remain idle until next Monday, the average for the week may fall well below 30 per cent.

A substantial rebound is looked for next week, although the rate may not reach the 38 per cent level maintained in the last two weeks of June. A low operating rate in July is in line with seasonal expectations. The summer recession, however, will be less severe and of shorter duration than in 1934, according to prevailing views in the trade.

The automobile industry, in keeping with its plan to start production of new models in September, will doubtless resume the placing of substantial steel orders in August. Agricultural buying power, thanks to ample precipitation, is the best in four years. Farm equipment plants remain active though in a between-season period, while tractor manufacturers are still falling behind in their efforts to catch up with back orders. Unusually large canning packs, together with expanding demands for filling station oil cans and a brand new market for beer cans, point to a continuation of high operations among tin plate makers. The nascent revival of residential building, the growth of factory construction, the appearance of inquiries from the oil industry for pipe lines and refineries, and finally the increasing diversification of miscellaneous orders for iron and steel are also suggestive that the basis is being laid for broad business improvement.

SCRAP, always a sensitive barometer, likewise points to early trade improvement. A Youngstown district mill has closed for upward of 50,000 tons of steel-making scrap without developing further price weakness, and at Chicago a consumer purchase of heavy melting steel has resulted in an advance, raising THE IRON AGE scrap composite from $10.71 to $10.75 a ton.

Furnace coke at Connellsville has fallen another 15c. a ton to $3.35, but this change naturally followed the heavy accumulation of fuel stocks in anticipation of a coal strike that did not eventuate.

Base prices on pig iron and steel have thus far held without a break. Irregularities continue to be reported in the resale prices of distributers and in the interpretation of controversial points in the field of extras. A number of sheet mills have discontinued quoting prices on stamped blanks.

STEEL pipe awards are featured by the placing of 7000 tons for the Fort Smith, Ark., waterworks. A 300-mile natural gas line, requiring 22 to 24-in. steel pipe, is planned for construction from Indiana to Detroit. A refinery at Houston, Tex., will take 4000 tons of steel, while another Southwestern project, still in a tentative stage, involves pipe lines and a refinery calling for 60,000 tons of steel.

New York rapid transit companies have placed orders for 500 subway cars and 100 street cars.

Structural steel awards, mostly in small tonnages, total only 7000 tons as against 27,000 tons last week. New projects of 9000 tons compare with 56,675 tons in the previous week. Structural steel lettings in June totaled 70,815 tons against 52,200 tons in May and 60,275 tons in April.

THE Navy Department will take bids Aug. 7 on 13 vessels to be built in private yards and shortly thereafter will take tenders on steel for 11 ships to be constructed in Government yards. Steel requirements for the hulls are estimated at 45,000 tons.

THE IRON AGE composite prices for pig iron and finished steel are unchanged at $17.84 a ton and 2.124c. a lb. respectively. Copper, after holding for a little more than a year at 9c., Connecticut valley, has broken 1c. a lb. to 8c.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous; Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:	July 2, 1935	June 25, 1935	June 4, 1935	July 3, 1934
No. 2 fdy., Philadelphia	$20.3132	$20.3132	$20.3132	$20.26
No. 2, Valley furnace	18.50	18.50	18.50	18.50
No. 2 Southern, Cin'ti	19.2007	19.2007	19.2007	19.13
No. 2, Birmingham†	14.50	14.50	14.50	14.50
No. 2 foundry, Chicago*	18.50	18.50	18.50	18.50
Basic, del'd eastern Pa.	19.8132	19.8132	19.8132	19.76
Basic, Valley furnace	18.00	18.00	18.00	18.00
Malleable, Chicago*	18.50	18.50	18.50	18.50
Malleable, Valley	18.50	18.50	18.50	18.50
L. S. charcoal, Chicago	24.2528	24.2528	24.2528	24.04
Ferromanganese, seab'd carlots	85.00	85.00	85.00	85.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivery quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$36.37½
Light rails, Pittsburgh	35.00	35.00	35.00	35.00
Rerolling billets, Pittsburgh	27.00	27.00	27.00	29.00
Sheet bars, Pittsburgh	28.00	28.00	28.00	30.00
Slabs, Pittsburgh	27.00	27.00	27.00	29.00
Forging billets, Pittsburgh	32.00	32.00	32.00	34.00
Wire rods, Pittsburgh	38.00	38.00	38.00	38.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.70	1.70	1.70	1.70

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.80	1.80	1.80	1.90
Bars, Chicago	1.85	1.85	1.85	1.95
Bars, Cleveland	1.85	1.85	1.85	1.95
Bars, New York	2.15	2.15	2.15	2.23
Plates, Pittsburgh	1.80	1.80	1.80	1.85
Plates, Chicago	1.85	1.85	1.85	1.90
Plates, New York	2.09	2.09	2.09	2.13
Structural shapes, Pittsburgh	1.80	1.80	1.80	1.85
Structural shapes, Chicago	1.85	1.85	1.85	1.90
Structural shapes, New York	2.06¼	2.06¼	2.06¼	2.10¼
Cold-finished bars, Pittsburgh	1.95	1.95	1.95	2.10
Hot-rolled strips, Pittsburgh	1.85	1.85	1.85	2.00
Cold-rolled strips, Pittsburgh	2.60	2.60	2.60	2.80

Finished Steel

Per Lb.:	July 2, 1935 Cents	June 25, 1935 Cents	June 4, 1935 Cents	July 3, 1934 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.40	2.40	2.40	2.65
Hot-rolled annealed sheets, No. 24, Gary	2.50	2.50	2.50	2.75
Sheets, galv., No. 24, P'gh	3.10	3.10	3.10	3.25
Sheets, galv., No. 24, Gary	3.20	3.20	3.20	3.35
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	2.00
Hot-rolled sheets, No. 10, Gary	1.95	1.95	1.95	2.10
Wire nails, Pittsburgh	2.60	2.60	2.60	2.60
Wire nails, Chicago dist. mill	2.65	2.65	2.65	2.65
Plain wire, Pittsburgh	2.30	2.30	2.30	2.30
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.35
Barbed wire, galv., P'gh	3.00	3.00	3.00	3.00
Barbed wire, galv., Chicago dist. mill	3.05	3.05	3.05	3.05
Tin plate, 100 lb. box, P'gh.	$5.25	$5.25	$5.25	$5.25

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$11.75	$11.75	$11.75	$11.75
Heavy melting steel, Phila.	10.50	10.50	10.50	10.50
Heavy melting steel, Ch'go	10.00	9.87½	10.25	9.75
Carwheels, Chicago	10.50	10.50	10.50	9.75
Carwheels, Philadelphia	11.25	11.25	11.25	12.50
No. 1 cast, Pittsburgh	13.25	13.25	13.25	12.25
No. 1 cast, Philadelphia	11.25	11.25	11.25	12.25
No. 1 cast, Ch'go (net ton)	9.00	9.00	9.00	7.50
No. 1 RR. wrot., Phila.	10.25	10.25	10.25	12.25
No. 1 RR. wrot., Ch'go (net)	7.75	7.75	8.00	7.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.35	$3.50	$3.85	$3.85
Foundry coke, prompt	4.00	4.00	4.60	4.60

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	7.75	8.75	8.75	8.75
Lake copper, New York	8.12½	9.12½	9.12½	9.12½
Tin (Straits), New York	51.87½	51.25	51.00	51.37½
Zinc, East St. Louis	4.30	4.30	4.30	4.35
Zinc, New York	4.67½	4.67½	4.67½	4.70
Lead, St. Louis	3.85	3.85	3.95	3.60
Lead, New York	4.00	4.00	4.10	3.75
Antimony (Asiatic), N. Y.	12.75	12.75	12.75	7.75

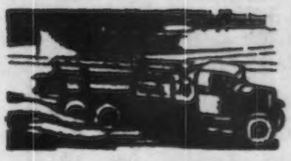
On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
July 2, 1935	2.124c. a Lb.	$17.84 a Gross Ton	$10.75 o Gross Ton
One week ago	2.124c.	17.84	10.71
One month ago	2.124c.	17.84	10.83
One year ago	2.199c.	17.90	10.67
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	High	Low	High	Low	High	Low
1935	2.124c., Jan. 3;	2.124c., Jan. 8	$17.90, Jan. 8;	$17.83, May 14	$12.33, Jan. 8;	$10.33, April 23
1934	2.199c., April 24;	2.008c., Jan. 2	17.90, May 1;	16.90, Jan. 27	13.00, Mar. 13;	9.50, Sept. 25
1933	2.015c., Oct. 3;	1.867c., April 18	16.90, Dec. 5;	13.56, Jan. 3	12.25, Aug. 8;	6.75, Jan. 3
1932	1.977c., Oct. 4;	1.926c., Feb. 2	14.81, Jan. 5;	13.56, Dec. 6	8.50, Jan. 12;	6.43, July 5
1931	2.037c., Jan. 13;	1.945c., Dec. 29	15.90, Jan. 6;	14.79, Dec. 15	11.33, Jan. 6;	8.50, Dec. 29
1930	2.273c., Jan. 7;	2.018c., Dec. 9	18.21, Jan. 7;	15.90, Dec. 16	15.00, Feb. 18;	11.25, Dec. 9
1929	2.317c., April 2;	2.273c., Oct. 29	18.71, May 14;	18.21, Dec. 17	17.58, Jan. 29;	14.08, Dec. 3
1928	2.286c., Dec. 11;	2.217c., July 17	18.59, Nov. 27;	17.04, July 24	16.50, Dec. 31;	13.08, July 2
1927	2.402c., Jan. 4;	2.212c., Nov. 1	19.71, Jan. 4;	17.54, Nov. 1	15.25, Jan. 11;	13.08, Nov. 22

Holiday Suspensions Reduce Steel Rate at Pittsburgh



Production Falls to 26 Per Cent While Output in Valleys and Wheeling District Declines More Sharply—Schedule Still Tentative

PITTSBURGH, July 2.—The local steel industry will take a short breathing spell over the holiday, but retrenchments at this time are much more moderate than they were in the Independence Day week last year. All operating plans at the beginning of this week are tentative and are subject to immediate change if pressing orders are received before the holiday. Most mills plan to close on Wednesday night for the remainder of the week, while others will be down only for the holiday. Discounting July 4, raw steel output in the Pittsburgh district will probably be off an average of six points to 26 per cent. In the Valleys and the nearby northern Ohio district production is expected to slip eight points to about 35 per cent. The Youngstown Sheet & Tube Co., which went off production yesterday morning, will resume some time on Thursday with nine open-hearths. Estimated output for the week in the Wheeling district is 38 per cent, representing a 10 point drop.

Finishing mill operations this week are difficult to gage. Sheet mill output is roughly estimated at 35 to 40 per cent, tin plate at around 60 per cent, and strip steel 20 to 25 per cent.

Sharp rebounds from the holiday levels are practically certain for next week, and the operating rates at that time will not reflect clearly the trend of steel demand. Although volume of new business on a whole is relatively moderate, the unusual steadiness of consumer buying at this season is giving further assurance that the summer recession will not be severe.

Bituminous coal and furnace coke prices have softened further in consequence of another postponement of a strike. A Youngstown district mill has purchased a substantial tonnage of scrap at prices representative of the prevailing market in the district.

Pig Iron

The summer lull in this market is becoming pronounced. Only occasional car-lot orders are dribbling in, and the current week may mark the low spot in view of holiday shutdowns. The Standard Sanitary Mfg. Co. has purchased a moderate quantity of high-phosphorus, low-manganese pig iron for its recently reopened Pittsburgh plant.

Semi-Finished Steel

Volume of new business has drifted lower with the advent of the holiday week. Reduced demand for sheet bars from the automotive industry and also from detached tin plate mills is becoming more evident. At the same time, the hand-to-mouth buying policy that has ruled in this market for many months will tend to offset any serious summer recession in view of generally low mill stocks. Prices are being rigidly maintained.

Bolts, Nuts and Rivets

Some producers report that June tonnage topped May business. On a whole, however, the trend in demand has not been conclusive. The outlook in the current month is brightened by prospective demand for bolts and rivets for the Chesapeake & Ohio cars, for which contracts were placed last week. Not many bolts will be needed, but quite a large quantity of rivets, ½ in. and larger, will be specified. Automotive demand has waned, while miscellaneous consumption reflects seasonal conditions.

Rails and Track Accessories

The local rail mill is expected to run on small orders one or two days this week, and may attain a better schedule next week. Little new rail and accessories business is reaching producers in this district. Miscellaneous small orders are the general rule.

Reinforcing Steel

About 1200 tons will be specified for a sewer job in Washington, for which Walter F. Kiddee Co., New York, holds the general contract. The addition to the Congressional Library will require about 325 tons. Reinforcing steel producers in the Pittsburgh district do not expect any important road work to be released until September or October, and such delay would mean deferment of a large part of the work until next spring. June business scored a seasonal advance over May tonnage, and, despite delays in Federal spending and political hitches in crystallizing the plans of the Allegheny County Authority, demand shows an encouragingly steady tone.

Cold-Finished Bars

Demand is becoming spotty, and cold-finished producers are not sanguine of any definite improvement until the automotive industry swings into its new model schedules. Important tonnage for the 1936 automobiles is not expected until August. Miscellaneous interest has tapered. The generally lifeless tone of the market, however, is believed to reflect the usual lull of Independence Day week.

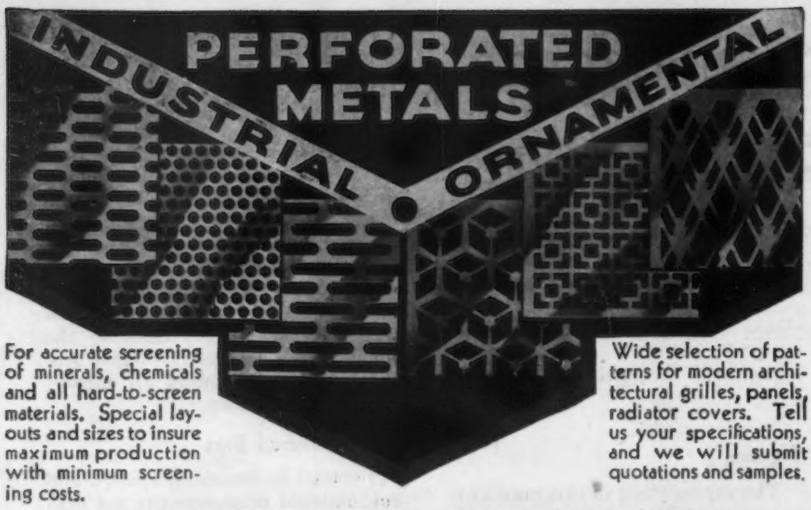
Plates and Shapes

The American Oil Co. is taking bids at New York on one to four steel oil barges, which will require about 225 tons of plates and shapes each. Two large barge inquiries now pending may reach a definite point after the holiday, but the tentative character of the inquiries does not provide definite assurance that orders will ultimately materialize. Little or no barge repair work is under way in this district. Plates for the construction of the Chesapeake & Ohio cars, which were placed last week, have not been ordered thus far.

New structural awards reported in this district, while lighter in volume, show a greater proportion of private work. A large share of private construction will be done at Detroit, where automotive body and wheel companies are expanding present facilities. The Chrysler Corpn. also will build an addition, requiring 520 tons.

Tubular Products

The Panhandle Eastern Pipe Line Co., subsidiary of Columbia Oil & Gasoline Corpn., expects to build a 300-mile natural gas line, requiring 22 or 24-in. steel pipe, from Indiana to Detroit; the line, including laying, would cost approximately $9,000,000. The 163-mile pipe line from Wyoming to Nebraska, for which Williams Brothers, Tulsa, Okla., hold the general contract, will be constructed largely of reconditioned pipe which is being purchased in various fields in Wyoming. Only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about 33 miles of new pipe probably will be necessary. Reports of producers in this district reflect somewhat mixed trends in demand. Those serving a large part of the oil country demand are maintaining fairly regular schedules, while other pipe mills specializing in other grades report a downward trend in aggregate movement. Many units will be inactive through the week, while some mills will close Wednesday night for the remainder of the week. Pipe production this week consequently will be cut practically in half, but is expected to rebound sharply next week.

Bars

Orders in the past week were in fair volume. Miscellaneous demand seems to be on an unusually even keel and continues to be the mainstay of this market. With motor car manufacturers nearing the final run on current models, bar producers are resigned temporarily to a quiet spell until changeovers for the new models are made later in the summer. Farm implement and tractor manufacturers still are important factors in the current market.

Wire Products

Producers in this district report that June tonnage ran slightly less than that in May. Seasonal dwindling in demand is becoming more acute, although a fair tonnage of miscellaneous items continues to be ordered. Delays in allocating funds from the Federal Works Relief Bill are depressing the movement of wire mesh for road construction. Wire mill production in this district probably will be curtailed sharply, owing to the holiday, but in one or two instances shutdowns will be for the holiday only.

Sheets

A heavy influx of miscellaneous orders last week will partly offset general holiday recessions in the sheet industry. Some mills will be closed from Wednesday night through the week, but all current operating plans hinge on the flow of orders prior to the holiday. Automotive specifications are in decreasing volume. Sheet production this week is difficult to estimate in view of the holiday interruption and tentative schedules. A fair average would be 35 to 40 per cent.

Tin Plate

Releases are appearing in heavier volume, and mill warehouse stocks are being liquidated at a satisfactory rate. New specifications for later delivery are coming in with relative freedom, and some producers expect July to be the peak month for shipments. Based on a 12-turn week, representing a loss of four turns on account of the holiday, tin plate output will probably average around 60 per cent of theoretical capacity.

Strip Steel

Owing to the holiday some mills are closing early in the week, while other units will close on Wednesday night and remain down until Sunday night. Spot orders are the usual fare, and few producers can boast of backlogs at the outset of third quarter. Until renewed support from the automotive industry appears, strip operating schedules will probably be erratic. Holiday curtailments this week may send output down to around 20 per cent, but all estimates hinge upon order receipts from day to day.

Coke and Coal

Further postponement of a bituminous walkout has virtually stagnated this market. With consumers' yards overflowing with stocks accumulated in anticipation of a strike, heavy surpluses of coal on track at mines and elsewhere are going begging. The price structure again is becoming wobbly, and western Pennsylvania bituminous coals on an average are 15c. a ton lower. The coke market is in the doldrums. Prompt offerings of Connellsville furnace coke are 15c. a ton lower at ovens. Connellsville foundry coke thus far is resisting the general price trend.

Scrap

Trading has been brought to a virtual standstill by the holiday mood. Shipments are considerably slower owing to curtailment of open-hearth operations at most mills during the latter half of the current week. The indifference of consumers and sellers, as well as the limited offerings of small yard dealers, is keeping prices on a fairly even keel. The leading mill in this district last week disposed of 3000 tons of nickel armor plate scrap to local dealers who have sold it for export. An independent mill in Youngstown district has purchased a substantial tonnage of scrap. Prices paid included $12 for No. 1 heavy melting steel, $11.25 for No. 2 steel, $10.50 for No. 2 bundles and $9 for machine shop turnings.

Pickling Equipment.—International Nickel Co., 87 Wall Street, New York. Illustrating and describing equipment, including continuous type, made of Monel metal for pickling billets and blooms, wire rods and wire coils, rods, bars, pipe and tubing; also Monel metal crates and other containers for sheet mill pickle departments, wire baskets and pails for dipping small stampings.

Boilers. — Combustion Engineering Co., Inc., 200 Madison Avenue, New York. Bulletin describing VM bent tube boilers for medium size and small plants, particularly where headroom is limited. Sizes range from 1359 to 6300 sq. ft. of heating surface and information is given on all boiler and setting dimensions for sizes within this range. Blueprint reproductions are included.

Chicago Output Drops On Eve of Holiday

Growing Diversity of Orders and Expanding Farm Income Presage a Fall Upturn in Business — Scrap Prices Strengthen

CHICAGO, July 2.—Mills are taking close measure of production schedules on the eve of the holiday and accordingly ingot output is off three and one-half points to 37½ per cent of capacity. However, both sales and specifications for finished steel show some improvement and they are comparable with any week since the end of April. Last week one mill found itself short of raw steel and this week expects to find itself in a similar position. Hence the addition of several open-hearth furnaces to the active list is indicated.

Plate sellers are taking a more optimistic view of the whole situation. Fort Smith, Ark., has placed 7000 tons, pipe lines and a refinery in the Southwest call for about 60,000 tons, and the materials for the Chesapeake & Ohio cars will be probably ordered before this week is out.

The attitude of all concerned in the steel trade is that the summer drop in business will be less than usual and that the early fall will see an upturn of fair proportions. Of vital interest in the Mississippi Valley is the agricultural outlook, which, due to ample rain, is the best in four years. In many localities rains delayed planting and are retarding the marketing of crops, but the background is laid for a substantial income to farm communities with a resultant favorable reaction on general business throughout the Central West.

All iron and steel prices are steady with the exception of dealers' quotations on reinforcing bars. Scrap quotations show moderate strength under the leadership of steel mill grades.

Pig Iron

Orders are reaching foundries in such volume that the trade has come to the conclusion that the summer lull will be of short duration. The farm implement units are busy and automobile foundries are counted on to start in August, which is also about the time the stove and furnace units will begin to build up stocks. June shipments of Northern iron were 30 per cent ahead of the total a year ago.

Coke

June prices have been extended for deliveries in July. June shipments were 65 per cent heavier than in the sixth month a year ago.

Reinforcing Bars

Awards total about 2500 tons, including 1000 tons for a school at Kansas City, Mo., and 800 tons for Sanitary District Work in Chicago. Fresh inquiries are light. The character of this summer's market is indicated by the fact that one dealer has taken about 600 tons in very small lots. Prices are giving much concern to the trade, schedules appearing to be on more or less of a theoretical basis, especially on large tonnages. A disturbing factor is lack of road work, which is usually active in the early summer. Designs were first changed to eliminate a large part of the bar tonnage and now the bar-skinned projects fail to appear for active bidding.

Cast Iron Pipe

Current business is confined to scattered and small lots, most of which seem to be made available through old Government loans. New Federal money is not yet at hand and some sellers fear that two or three months may pass before a substantial number of projects get under way. Foundries are maintaining fair schedules and are casting more pipe than they are shipping.

Rails

A Western railroad has placed 4000 tons of rails with a Chicago mill, which has already started to roll the order. Mill operations remain steady and schedules are well arranged for the next five or six weeks. Close to 6000 tons of accessories have been ordered and they are wanted for quick delivery. Business of this kind during the last three weeks has been the best of the year. Enlarged maintenance programs are being undertaken by a number of railroads that did lit-

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tle work at the opening of the track work season.

Wire Products

Output is holding at 45 per cent of capacity and incoming orders are well above the average a year ago. The only noticeable change in the character of this market since a week ago is that both new buying and specifications are far more spotty. Government work is slow and is bringing little tonnage to wire mills. An encouraging development is the fact that several railroads have ordered a total of about 200 tons of fencing for rights-of-way. Other railroads are beginning to talk about the poor condition of long stretches of their fences. Corn planting is late because of excessive rainfall, but otherwise the agricultural outlook is very promising, and, though the beginning of July is usually a dull season, the present period is proving an exception to the rule, movement into country areas being about three times what it was a year ago.

Cold Rolled Strip

New business is up moderately, but production is still in excess of bookings. Miscellaneous manufacturers are the big factor at this time, and specifications cover extreme ranges of sizes and classifications.

Sheets

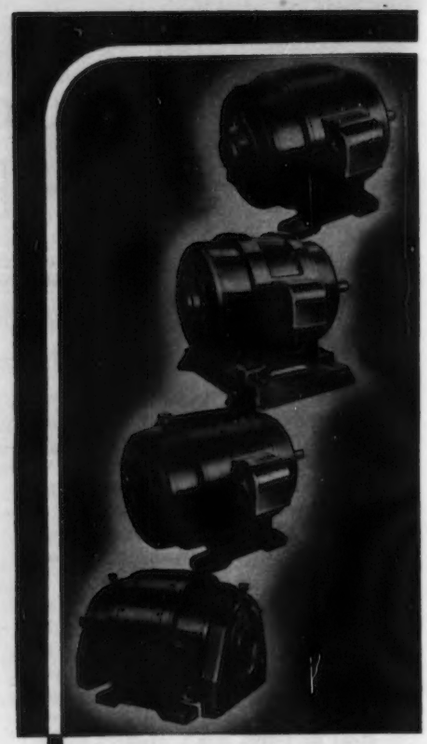
Specifications from automobile plants entered at mills during the past two weeks will have been shipped in full by the middle of the month, after which producers expect they will get little from that direction until about the time new model assemblies start. Miscellaneous demand for sheets is holding up well, while refrigerator manufacturers are working near capacity. Vegetable and fruit crops promise to be very large and on the strength of this situation tin mills are working near capacity.

Plates

Taylor Forge & Pipe Works, Chicago, has booked 7000 tons of steel pipe for Fort Smith, Ark. A refinery at Houston, Tex., for the Shell Petroleum Corpn., calls for 4000 tons of steel, and a pipe line in that neighborhood will take 4000 tons. A project which is being kept very quiet for the present is said to call for 50,000 tons of steel pipe. It is reported that the materials for the Chesapeake & Ohio cars will be ordered this week.

Structural Material

Both awards and inquiries are slim if one does not count the



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Mississippi River program, plans for which are now reaching contractors and fabricators. The catch is that bids may not be taken as now planned and the entire program may be set back until fall.

Bars

Sales have jumped up sharply to 30 per cent above the total in the previous week, and this change has taken place without real support from automobile centers. Farm implement manufacturers are still well engaged and tractor plants are heavily burdened in efforts to reduce back orders. Substantial quantities of steel are moving to road machinery plants.

Scrap

A local mill has taken a small tonnage of heavy melting steel at $10.25 a gross ton, delivered, which is 25c. above the last recorded sale. Mills are still accepting shipments in excess of actual requirements and their stock piles are growing at a fairly rapid pace. Dealers have their eyes on the malleable supply, which is not large, and they anticipate that demand in the late summer will be heavy.

Large New Public Jobs on Coast

SAN FRANCISCO, July 2.—Bookings of reinforcing bars on the Pacific Coast during the first six months of 1935, totaling 62,340 tons, surpassed those placed in the same period in 1934 by approximately 2286 tons. However, awards of structural steel, plates and cast iron pipe showed a loss as compared with the first half of last year. Structural lettings aggregated 42,657 tons for the first six months against 60,543 tons for 1934. Steel plates showed the greatest loss, with a total of 20,988 tons to date for the year against 44,370 tons at the same time last year. A total of 16,211 tons of cast iron pipe has been booked during the past half, while 22,874 tons was placed in the corresponding period in 1934.

Major projects in view, if given Federal assistance, promise to reverse the situation and put the closing half of 1935 well above the 1934 mark. Seattle is contemplating 27 miles of water system improvements which will require 12,000 tons of steel pipe. San Diego will receive Federal backing on the El Capitan pipe line on which approximately 4000 tons of plates are specified. The Boulder Dam transmission line, to be constructed for the Metropolitan Water District of southern California, will involve 6000 tons of shapes and nearly 3000 tons of copper and steel-reinforced aluminum conductors. The conductor tonnage will be one of the largest ever placed on the Pacific Coast.

Activity during the past week was at a minimum. Warehouse business continues to show small but favorable gains. To date prices have held steady.

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Cast Iron Pipe

Chelsea, Mass., has closed bids on 100 tons of 6- and 10-in. United States Pipe & Foundry Co. is low bidder.

East Longmeadow, Mass., contemplates installing a water main extension from South Main and Chestnut Streets to Hampden town line.

Keytesville, Mo., plans pipe lines for water system. Fund of $55,000 has been arranged for this and other waterworks installation. Russell & Axon, 4903 Delmar Boulevard, St. Louis, Mo., are consulting engineers.

Board of Public Works, City Hall, Los Angeles, asks bids until July 17 for gas, hot and cold water piping systems at Terminal Island sewage treatment plant, San Pedro, including wrought iron pipe, 1000-gal. capacity steel tank for fuel oil storage, hot water tank, fittings, etc. (Project 5633.)

Beaumont, Tex., plans 13,600 ft. of 12-in. for main water line extensions. Cost about $35,500; also valves, fittings and fire hydrants, cost $21,700. Financing is being arranged through Federal aid.

Hull, Ill., plans pipe lines for water system; also other waterworks installation, bids to be asked soon. Beard Engineering Co., Title Guaranty Building, St. Louis, is consulting engineer.

Talladega, Ala., plans water pipe lines; also construction of dam and other waterworks improvements. Fund of $60,000, is being arranged through Federal aid. Wiedeman & Singleton, Candler Building, Atlanta, Ga., are consulting engineers.

Cunningham, Kan., plans pipe lines for water system. Special election has been called to approve bonds for $22,000 for this and other waterworks installation.

Board of Public Works, Indianapolis, plans pipe line for main water supply in Thirty-eighth Street, from Fall Creek to Emerson Avenue. Cost about $50,000. New pipe line also has been authorized for similar purpose in part of Westfield Boulevard.

Omak, Wash., closes bids July 9 for 7900 ft. of 6- and 10-in. for water lines; also for pumping unit with capacity of 800 gal. per min., and auxiliary equipment.

Gainesville, Ga., plans pipe lines for water system. Special election has been called on Aug. 6 to approve bonds for $60,000 for this and other waterworks installation.

East Tupelo, Miss., plans about three miles of pipe for water system; also new water reservoir and other waterworks construction. Special election has been called on July 16 to approve bonds for $36,000. R. M. Striger, Tupelo, is consulting engineer.

Morton, Miss., plans water pipe lines; also elevated steel tank and tower and other waterworks equipment. Fund of $35,000 has been arranged. F. P. Gates, Jackson, Miss., is consulting engineer.

Anton, Tex., plans pipe lines for water system; also elevated steel tank and tower and pumping station. Fund of $21,000 is being arranged. H. N. Roberts, Lubbock, Tex., is consulting engineer.

Tucapau, S. C., plans pipe lines for water supply and other waterworks installation. Fund of $163,820 is being arranged through Federal aid for this and new sewage system.

Garden City, Utah, has awarded 181 tons to Pacific States Cast Iron Pipe Co.

Inglewood, Cal., has let 100 tons to United States Pipe & Foundry Co.

San Francisco, Cal., has opened bids on 127 tons on which American Cast Iron Pipe Co. is low bidder.

Cleveland-Lorain Rate Falls to 21 Per Cent

Summer Lull Expected to Be of Short Duration — Large Youngstown Scrap Order Strengthens Old Material Market

CLEVELAND, July 2.—With little new business from the automotive industry, demand for finished steel continues to taper. The Lorain steel plant is shut down this week because of the holiday, and this accounts in large part for a 20-point drop in ingot output in the Cleveland-Lorain territory to 21 per cent of capacity. A Cleveland steel plant has taken off one open-hearth furnace and will shut down only one day. Sheet mill operations have been further reduced.

A seasonal decline in activities is in evidence among manufacturers of household equipment, and lack of business from these consumers is being felt by the sheet mills. Whether refrigerator manufacturers will need additional steel this season will depend on whether retail sales are sufficiently large to clean out present stocks.

Steel makers believe that the summer lull will be of rather short duration, since the early start scheduled for the production of new models of automobiles this year should cause motor car manufacturers to resume the placing of substantial orders in August. The Chrysler Corpn. has placed an order with the Midland Steel Products Co., Cleveland, for frames for its 1936 models. The Midland company states that this order will exceed $6,000,000.

A movement is under way to cause sheet mills to cease producing blanks or performing first operations for sheet metal parts. Several mills sell stamped blanks either directly or through subsidiaries, thus competing directly with stamping plants, and during the operations of the steel code when there was no price regulation for blanks there were complaints about prices quoted on blanks to some of the automobile manufacturers. Pending the adoption of a definite policy on this matter, some of the sheet mills have discontinued quoting prices on blanks.

The five locomotives for which the Chesapeake & Ohio took bids last week have not been placed. The 61,000 tons of rolled steel for the 5125 cars recently ordered by the railroad will be purchased directly by the car builders. No deviation from regular prices on steel products or pressure for concessions is reported.

Bars, Plates and Shapes

Orders for steel bars from forge shops and other manufacturers of automobile parts, and also for alloy steel bars, have fallen off rather sharply. Demand from the agricultural implement industry continues good. Activity in the construction field has subsided. However, a considerable tonnage of structural steel and reinforcing bars is pending for the Muskingum District Conservancy project, for which bids are being taken this week.

Pig Iron

Some activity has developed in third quarter contracts. Several consumers who still make quarterly contracts but who did not take out all their second quarter iron, have made new commitments covering the additional iron they expect to melt during the current quarter. One Lake furnace interest sold 5000 tons during the week, including iron added to extended contracts. An Ohio stove foundry bought 1500 tons of foundry iron from another producer. July shipments are expected to be considerably heavier than during the same month last year. A price advance July 1 last year caused consumers to stock up heavily in June and there was very little business during the first few weeks of the third quarter.

Iron Ore

Shipments of Lake Superior ore during June were 4,241,636 tons, a gain of 737,841 tons over May and a decrease of 219,177 tons as compared with June last year. However, with a better movement early in the season this year than last year, shipments are well ahead of a year ago. The movement until July 1 was 8,145,493 tons as compared with 7,091,385 tons during the corresponding period a year ago, or a gain of 1,054,108 tons or 14.86 per cent over the same period last year.

Sheets

New business from the motor car industry is light and mill operations are tending downward.

WAREHOUSE OR MILL SHIPMENT

ON

HY-TEN, ECONOMO, & S. A. E. STEELS

WHEELOCK, LOVEJOY & COMPANY, Inc.

CAMBRIDGE CLEVELAND CHICAGO NEWARK DETROIT

Orders from makers of household equipment also have slackened. Galvanized sheets are moving fairly well to fabricators in the building field and operations of some of the steel barrel manufacturers have improved slightly. The local sheet mill is operating at 45 per cent of capacity this week. The Monroe, Mich., mill is shut down for the week.

Strip Steel

Some good orders for both hot and cold-rolled strip for July and August shipment were placed by Indiana parts plants of the General Motors Co. during the week. A sizeable order for hot strip also came from a cold rolling plant. However, the aggregate volume of new business is rather light. Some small orders are coming from shovel manufacturers.

Bolts, Nuts and Rivets

Business in bolts and nuts has declined 10 to 20 per cent from the May volume, this being largely due to the slump in orders from the automotive industry. Regular quotations are being well maintained. Rivets are quiet and firm. The Chesapeake & Ohio freight cars will take 2500 tons, of which 1500 tons will be purchased in the open market.

Scrap

A Youngstown district mill has made a large purchase of steelmaking scrap estimated at from 40,000 to 50,000 tons, paying $12 for No. 1 heavy melting steel, $11.25 for No. 2 and $10.50 for No. 2 compressed sheet steel, or the same prices at which this company made its previous purchase. Dealers are covering against these orders at around 50c. a ton lower than their sales prices. The market is inactive locally. While prices have not advanced, the Youngstown purchase has given the market a firmer tone.

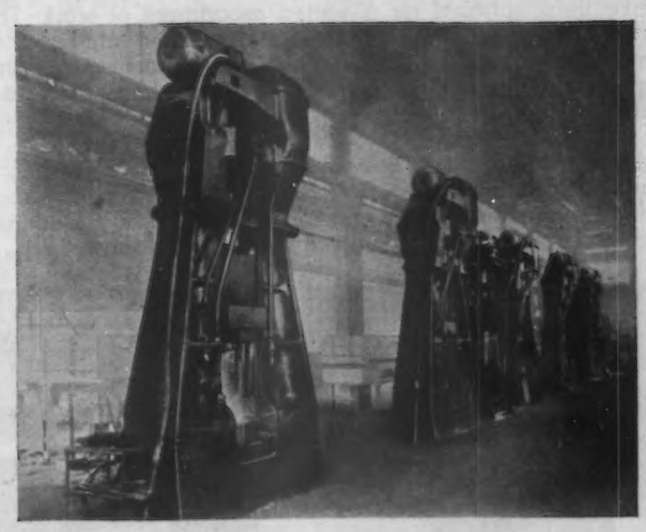
Pig Iron Bookings Up In Southern Ohio

CINCINNATI, July 2.—Opening of books for third quarter pig iron business, the past week, resulted in advance ordering of about 3000 to 4000 tons. Individual orders ranged from 100 to 500 tons for shipment to southern Ohio and contiguous Indiana territory. A substantial portion of commitments represents automotive anticipations, while machinery needs are also noted in current ordering for the first time this year. Despite the consumer movement to cover, district furnace interests report some buyer hesitancy as the result of carry-over inventories. Acceleration of contracting in the next few weeks is anticipated on reports of an early rise in the district melt. Prices are firm and buyers generally prefer to support the present market rather than to encourage a situation that might undermine quotations on finished products.

Unusually steady sheet demand, for this season, has sustained bookings at 55 per cent of mill capacity. Delay by one builder of low-priced automobiles in marketing current models is keeping specifications for automobile sheets slightly above the usual seasonal level. General buying, particularly among jobbers, tends to offset fluctuations in specialty lines. Prices continue steady, with virtually no pressure for lower quotations.

Specifications for by-product foundry coke continue to reflect the steady melt. Domestic coke business is without noticeable interest.

The scrap market is dull so far as new business is concerned. Buying for contracts constitutes the bulk of activity, dealers being wary of long positions. Quotations are unchanged in the absence of a test.



These hammers have increased production (31%) . . . they have reduced scrap (88%) . . . they have increased die life (100%).

Chambersburg Model J Board Drop Hammers, whether motor drive (as above) or belt drive, are repeating figures like these (quoted from reports of an actual installation) wherever they are installed as replacements on older hammers. Bulletin 252 tells why.

CHAMBERSBURG

MODEL J

BOARD DROP HAMMER

CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.

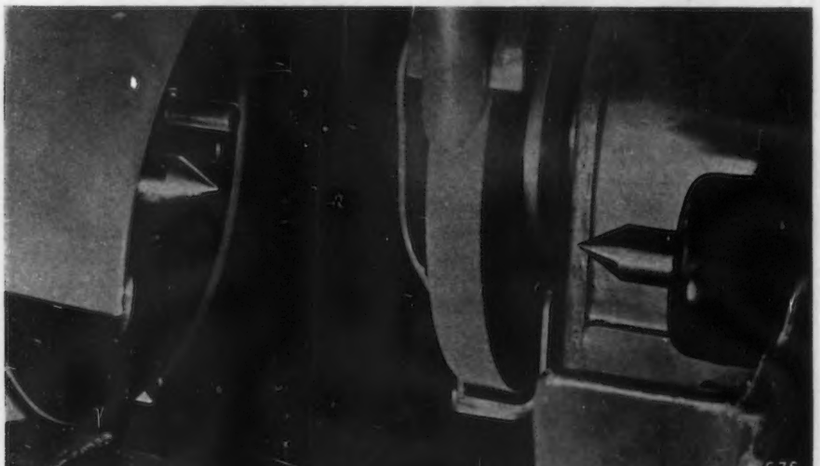
WITHOUT

Benefit of Special Equipment

● Special equipment is not necessarily required for economical high production grinding. In many instances standard plain or universal machines are found entirely adequate.

● The Landis Type C Plain Hydraulic Grinders, without benefit of special equipment of any kind, are being used for numerous high production jobs. Their flexibility plus the ease and quickness of change from one set-up to another make them suitable for a varied assortment of work. The Type C Hydraulic Universals, besides being universal in nature, are more productive than most machines of this type. Grinding departments are finding them quite desirable.

● Landis builds much special equipment but only when it can be economically justified. You may depend upon Landis engineers to recommend the less costly standard equipment when that is all that necessity demands. 188



LANDIS TOOL CO.
WAYNESBORO, PA.

Pipe Lines

North Central Gas Co., Casper, Wyo., J. M. McIntyre, president, plans new welded steel pipe line from Casper to Bridgeport, Neb., and vicinity, for natural gas supply at latter points, work to begin in about 30 days. Cost close to $1,000,000.

William T. McCormick, Pensacola, Fla., is at head of project to construct an artificial gas plant with steel pipe line distribution system at Atmore, Ala. Cost over $100,000.

General Purchasing Officer, Panama Canal, Washington, asks bids until July 8 for 16- and 20-in. welded steel pipe (Schedule 3068).

Golding & Murchison, First National Bank Building, Dallas, Tex., Dudley S. Golding, head, plan new 8-in. welded steel pipe line from east Texas oil field to Texas City, Tex., and other nearby points on Gulf Coast, to be used by independent oil operators for crude oil transmission to terminal district noted. Republic Oil Co., Benedum Trees Building, Pittsburgh, is interested in project and will cooperate in construction, securing oil requirements for refinery at Texas City from new pipe line. Cost close to $1,000,000.

Lubbock, Tex., is arranging bond issue of $300,000, fund to be used for installation of a municipal steel pipe line for natural gas distribution. City Commission has authorized financing in amount noted.

Stanolind Oil & Gas Co., 712 Main Street, Houston, Tex., with headquarters at Tulsa, Okla., plans 6-in. welded steel pipe line in South Houston district, in connection with proposed new welded steel pipe trunk line from east Texas oil field, connecting with Houston-Texas City line of Pan-American Pipe Line Co., Texas City, Tex., an interest of Pan-American Petroleum & Transport Co. New South Houston line will approximate 12,000 ft.

Panhandle Eastern Pipe Line Co., subsidiary of Columbia Oil & Gasoline Corpn., has plans for a 300-mile natural gas line, requiring 22- or 24-in. steel pipe, from company's terminus in Indiana to Detroit, to cost approximately $9,000,000.

Fort Smith, Ark., has awarded 7,000 tons of steel pipe to Taylor Forge & Pipe Co.

Reinforcing Steel

Awards 4400 Tons—New Projects 3100 Tons

AWARDS

Quincy, Mass., 100 tons, school, to Truscon Steel Co.

Staten Island, N. Y., 1800 tons, grade crossings for Baltimore & Ohio Railroad, divided between Truscon Steel Co. and Joseph T. Ryerson & Son., Inc. These companies are expected to distribute bar tonnage among five steel companies.

Buffalo, 255 tons, William and Ogden Streets grade crossing improvement by Erie Railroad, to Truscon Steel Co.

Utica, N. Y., 100 tons, State hospital job, to Concrete Steel Co.

Detroit, 920 tons, parcel post building, to Concrete Engineering Co.

Chicago, 100 tons, Division J, Sanitary district, to Joseph T. Ryerson & Son.

Kansas City, Mo., 1000 tons, school building, to Concrete Engineering Co.

Denver, Colo., 100 tons, county diversion conduit, to Colorado Builders Supply Co.

NEW REINFORCING BAR PROJECTS

Washington, 1200 tons, sewer job; Walter F. Kiddee Co., New York, general contractor.

Washington, 325 tons, addition to Library of Congress.

Chicago, 1300 tons, Sanitary district, Contract No. 1; Eherlihy-Mid-Continent Construction Co., low bidder.

Tucson, Ariz., 156 tons, State underpass; bids opened.

New Boston, Ill., 625 tons, locks on Mississippi River.

Los Angeles, 478 tons, Del Valle Avenue conduit; bids July 8.

Seattle, 100 tons, Ballard trunk sewer; general contract awarded.

Tacoma, Wash., 206 tons, bridge at East Eleventh Street; application has been made for PWA loan.

Scrap Lethargic At Detroit

DETROIT, July 2.—Although there has been no material change in the local scrap market, sentiment is slightly better. Consumers are showing little interest in making purchases. Prices are fairly firm at levels which prevailed a week ago.

Philadelphia Rate Holds at 30 Per Cent; Decline is Expected

Seasonal Reduction in Steel Demand Particularly Severe in This Area — Prices Hold Steady—Scrap Firm

PHILADELPHIA, July 2.—The district operating rate will remain at about 30 per cent of capacity up until July 4, but the week-end rate is not expected to exceed 18 per cent. It is quite possible that the district rate may return to only a 25 per cent level next week if mills adhere to their present plans of keeping operating activity down until the current decline in steel demand is reversed.

The present reduction in steel buying is attributed to three causes, namely, the usual seasonal let-up in miscellaneous consumption, the die-changing period for autobody stamping plants, and an unusual slackening in highway construction as the result of delays in Federal money allotments. These three factors will probably remain in force for at least another month.

The small volume of business available has naturally enough increased competition among steel sellers. Despite this competition there has been no tendency among the sellers to shade published market quotations. Some buyers are still endeavoring to secure price concessions, particularly on larger orders, but this action is not nearly as prevalent at the present time as it was the week following the collapse of the NRA.

Pig Iron

Foundry melt is holding up fairly well, considering the drop in steel mill activity in this area. Buying of iron, however, continues to be limited mostly to 30-day deliveries. Only a few consumers have shown any willingness to stock third quarter requirements in view of the ever-present possibility of some furnace dropping prices in an effort to gain a greater share of what business there is available. Many foundries have expressed the belief that demand for castings should improve materially in the fall. This would be welcomed by nearby furnaces, although there will be even greater competition for business than in the past when the Colonial Iron Co. blows in its stack.

Sheets and Strip

Two local fabricators are buying occasional lots of stainless and high-tensile steels for navy work. Demand for full-finished sheets is particularly light during this period of die changing in preparation for new automobile models. Strip sales are confined to miscellaneous small lots with an occasional larger sale to local radio makers. Edward G. Budd Mfg. Co.'s recent purchase of 40,000 tons of heavy-gage sheets from Alan Wood Steel Co. was the largest single purchase of steel made here this year and, as such, is still claiming the interest of the trade. Trial deliveries of this steel will begin in August and continue throughout the year. The Budd Company has purchased a blanking press and a forming press to process this steel into Chevrolet frames.

Bars, Plates and Shapes

Awards and fresh demand for both plates and shapes are at a low ebb, and sellers look for no significant improvement over the next month. The only pending plate order of any consequence is for the two oil tankers to be built by Sun Shipbuilding Co. The market for shapes continues far below seasonal expectations. The only award of the week calls for 100 tons for an office building at Wilmington, Del., to be fabricated by McClintic-Marshall Corpn. A theater building at Wilmington, requiring 200 tons, is to be readvertised, and bids for a post office in the same city are due July 22. A sizable tonnage of shapes will be required for a post office at Atlantic City, N. J., on which tenders are due July 26, and drawings will be out during the next week on a high school in Reading, Pa., which will require 150 tons. An addition to the Elks' club at Wilmington, Del., will require 165 tons.

Imports

The following iron and steel imports were received here last week: 15 tons of ferromanganese from Norway; 2044 tons of chrome ore from Cuba, 100 tons from British South Africa, 4000 tons from Portuguese Africa and 1649 tons from British India; 2 tons of drill steel from Norway; 9 tons of steel bars

MARVEL

Cuts -- Metal to 18" by 18"
-- Hours to Minutes
-- Cutting-Costs to a Fraction

The New MARVEL No. 8 *Model Cutter* BAND SAW

The MARVEL No. 8 is the most universal saw made—makes every type sawing cut, handles the smallest, most delicate job or big work up to 18" x 18". It cuts to size and shape—eliminates much tedious shaping and roughing. It turns "warehouse cutting extras" into profits. Cuts inventory investment, for with a few stock sizes you can cut your own die plates, etc. It will end costly delays; will keep other machines running.

In tool rooms, die and general machine shops you will find the MARVEL No. 8 the busiest machine tool on the floor. Its speed, accuracy, easy operation, and all-around utility, keep it building *profits* in innumerable ways.

Maximum throat: depth 18½ inches, height 21 inches. Cuts straight or at 45° without moving work. Power or hand feed—compensating blade pressure.

Write for Bulletin

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
349 N. Francisco Ave., Chicago, U. S. A.

For constant uniformity of product

WYCKOFF Controlled

COLD DRAWN STEELS

Scientifically solves steel problems involving uniformity of product, depth of hardening, toughness and surface hardness of penetration . . . enables us to duplicate the latest and most efficient grade of cold drawn steel for your purpose, time after time with laboratory precision . . . assuring a decided savings in your manufacturing costs.

Investigate the unusual advantages of WYCKOFF Controlled Cold Drawn Steels today—our metallurgists will be glad to analyze your particular requirements and recommend the correct steel for your purpose.

WYCKOFF DRAWN STEEL COMPANY

General Offices: First National Bank Building, Pittsburgh, Pa.
Mills at Ambridge, Pa. and Chicago, Ill.

Manufacturers of Cold Drawn Steels

Turned and Polished Shafting Turned and Ground Shafting

from Sweden and 29 tons from Germany; 231 tons of steel sheets and 4 tons of steel bands from Germany; one ton of steel bands, 140 tons of structural shapes and 41 tons of diamond plates from Belgium, and 23 tons of steel tubes and 5 tons of steel forgings from Sweden.

Scrap

This market continues steady with prices showing no tendency to move in either direction. No. 2 steel is particularly active. Five mills are taking deliveries of this grade and brokers continue their steady purchases at Port Richmond for foreign delivery. There is no domestic interest in No. 1 steel, but brokers are easily able to assimilate all of this grade which is being delivered to Port Richmond at the usual $9.50 a ton price for shipment abroad. One boat is currently loading 5000 tons of steel for Japanese delivery and at least five more are expected during the month to carry both No. 1 and No. 2 steels to Japan, Italy and England. Although brokers are receiving new commitments from Italy, the Japanese market has about dried up. That country is currently saturated with scrap, and steel mills there have been faced with constantly declining demand during the past month. N. Block, Norfolk, Va., has just been awarded five naval destroyers for scrapping before Dec. 31, 1936. Block's bid was $50,500, as compared with the next highest bid of $35,745, which was entered by Union Shipbuilding Co., Baltimore.

Exporters Dominate Boston Scrap Mart

BOSTON, July 2.—Exporters continue to dominate the scrap market, shipments for Pennsylvania delivery being practically nil. While exports have been held up to some extent by lack of vessel space, shippers continue to pile up material on dock. The common price paid for No. 1 steel is $8.50 a ton, delivered dock, and for No. 2 steel, $7.50, but in both instances slightly higher has been paid for material. A boat will finish loading 5700 tons here Saturday for Italy; another is loading several thousand tons for Rumania; and a third boat, 1000 tons for Italy. Providence, R. I., exporters are still awaiting steamers.

The pig iron market has lapsed into another inactive spell, sales during the week aggregating but a few hundred tons, mostly Buffalo, Indian and Dutch brands. Prices are holding,

Virtually all foundries operated during the first half have contracted for last half coke requirements.

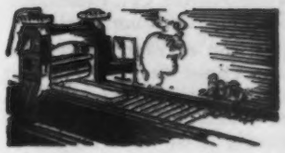
The rank and file of warehouses are maintaining full price schedules, but a local and a Worcester, Mass., concern are quoting about 25c. per 100 lb. under the market; consequently the situation is more or less unsettled.

Metal Mouldings Corpn., Detroit, has moved to a new plant at 4559 Wesson Avenue, which has been especially designed to meet the needs of its growing business.

Multi Plate Bridges. Armco Culvert Manufacturers' Association, Middletown, Ohio.—Attractively printed and illustrated brochure of 48 pages describing in detail construction of low cost bridges of multi plate and stone construction. Design of all bridges illustrated is clearly explained.

Power Presses. Joseph Hyman & Sons, Philadelphia.—Illustrated catalog of used power presses for sheet metal stamping.

Further Seasonal Recession In New York District



Bookings Continue to Shrink — Price Irregularities More Numerous—Large Rapid Transit Orders Are Placed—Navy Bids Asked

NEW YORK, July 1.—Demand for finished steel continues to taper in line with the customary seasonal trend. Preparations for Independence Day suspensions, which in the case of many consuming plants will continue through the week-end, have also contributed to the recession in buying. On the other hand, shipping orders for tin plate have shown material improvement as a result of requirements growing out of the pea pack.

In keeping with the dullness of the market, there are few significant developments in connection with prices. Quotations on fabricated structural steel continue to display weakness, but plain material prices are apparently holding. Greater irregularity is reported in the interpretation of controversial points in the field of extras and resale allowances to jobbers, particularly those affecting the marketing of galvanized sheets.

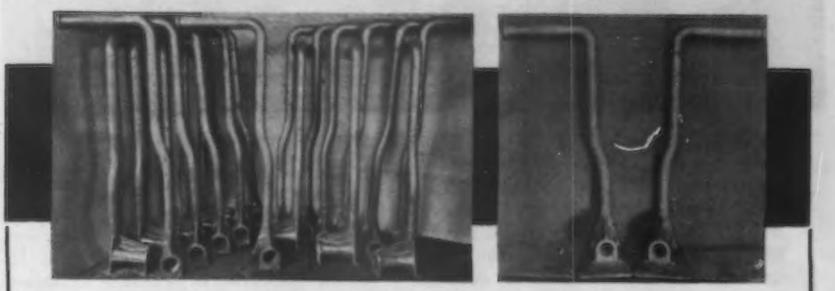
Makers of heavier rolled products have been given a lift by awards of 600 cars by local rapid transit companies. The Board of Transportation has placed 500 cars for the Independent subway system as follows: 250 with American Car & Foundry Co., 150 with Pullman-Standard Car Mfg. Co. and 100 with Pressed Steel Car Co. The Brooklyn - Manhattan Transit Corpn. has ordered 100 street cars of Hirshfeld design from the St. Louis Car Co. These are to be built of high-tensile steel. The 75,000 tons of steel now being placed for the 5125 Chesapeake & Ohio cars is being distributed in such a way as to give the road a maximum haul over its own lines.

The general contract for the Manhattan approach to the Thirty-eighth Street tunnel under the Hudson River has been placed and the award of the 4000 to 5000 tons of steel required is not far off. The McClintic-Marshall Corpn. is low bidder on the fabricated steel for the Bronx approach to the Triborough bridge, New York, calling for 9500 tons of steel.

The Navy Department will take bids Aug 7. on 13 vessels to be built in private yards, and shortly thereafter will take tenders on steel for 11 ships to be constructed in Navy Yards. Total requirements of hull material are estimated at 45,000 tons. A large replacement program for Coast Guard vessels has also been authorized. Beginning with the next fiscal year, the Navy plans to replace existing battleships at the rate of one a year. In addition to the battleship, the 1936-37 program tentatively calls for 12 destroyers and six submarines.

Pig Iron

Jobbing foundries report a falling-off of demand for small castings, but this slack has been taken up by the fairly good operations of heavy machinery foundries. Many Connecticut plants closed down on June 28 and probably will not reopen until July 8, during which time inventory will be taken and cupolas relined. It is quite possible that this inventory period may be followed by scattered buying of fill-in lots of iron. Total bookings of district sellers last week amounted to 2200 tons, about one-fourth of which is for consumption outside this district. Sales in



Bend DURIRON?

Certainly looks that way, doesn't it?

But, of course, it isn't bent—these bow-legged steam jets were made that way by welding.

This picture shows a few of the many steam jets that are to be used in the continuous sheet pickler of a prominent automobile manufacturer. They are in two different lengths, half of them "rights" and half of them "lefts." The foot piece is set off at an angle of about 10°. A right and a left are used in opposite corners of the tank. The curve in the riser causes it to lay against the side of the tank, making the full width of the tank available for the sheet.

This illustrates what can be done with Duriron to meet special requirements.

Perhaps Duriron can be adapted to your use—we will be glad to tell you if it can, of course. And by using Duriron you do lower your costs—that's provable.

●

THE DURIRON COMPANY, Inc.
438 N. Findlay St. Dayton, Ohio

the previous week amounted to 2100 tons and 1000 tons was sold in the period a fortnight ago. Most of the current bookings call for 30-day delivery, although some orders extend through the third quarter. All prices are unchanged and steady.

Reinforcing Steel

Miscellaneous business continues to be spotty and none too plentiful. Road building demands for bars and wire are far under seasonal expectations as the result of delays in Government allotments for these projects. The Cornell Contracting Co. has made no award of 4000 tons of bars for the approach to the mid-town tunnel. The bar requirements of several Staten Island, N. Y., grade crossings of the Baltimore & Ohio Railroad, amounting to about 1800 tons, have been divided between Truscon Steel Co. and Joseph T. Ryerson & Son, Inc. These two companies will purchase the bars from five steel companies. Bids are in on two alternates of the Dyckman Street bridge in New York which will require 200 tons of bars. No award has yet been made.

Scrap

Although the market undertone displays signs of softness, there have been no significant downward revisions in brokers' buying prices. Not only is the continued poor operations of domestic mills bearing adversely on scrap here but, in addition, the more important export market has lost much of its snap. Shipments to Italy are more liberal, but Japanese deliveries on old contracts are currently in unchanged volume. However, this latter country is now practically disinterested in new commitments. In fact, the scrap congestion in Japan has recently been so pronounced that buyers there have diverted scrap cargoes to the English market, with consequent unsettlement of prices there. Also, the withdrawal of Japan has resulted in greater competition for Italian business. Brokers are still paying $8.50 for No. 1 steel on barges and from $7 to $7.50 a ton for No. 2 steel. In the domestic market brokers are paying $2.50 for turnings for Pittsburgh delivery, and $6 to $6.50 for heavy breakable cast for Harrisburg, Pa., delivery. A Brooklyn dealer recently paid $8.76 a ton for 1200 tons of scrap girder rails sold by the City of New York. This bid was considerably above other offers.

Stove Industry Still Active at St. Louis

ST. LOUIS, July 2.—Business in finished iron and steel is slowing up in virtually all lines except sheets for the stove industry, whose trade is reported to be much better than usual at this season. Warehouse trade for June was about on a par with May, although considerably below last June, which was one of the best months of 1934; for the first six months of 1935 it is said to have been about 10 per cent ahead of the first half of last year. Stupp Brothers Bridge & Iron Co. has been awarded 120 tons for a coal tipple for the Burlington railroad. The St. Louis Shipbuilding & Steel Co. is building a 60-foot barge for the Choctaw Transportation Co., Clarendon, Ark., requiring 120 tons of plates.

The pig iron market is extremely quiet. Those melters without sufficient iron to run them through the third quarter are waiting until they actually need the iron before ordering it. The stove industry continues at more-than-seasonal operations.

The scrap market is dull, and neither mills nor dealers are showing any interest in the market. There is said to be no distress scrap on the market. Prices are unchanged.

Another Blast Furnace To Be Stopped in South

BIRMINGHAM, July 2.—The pig iron and steel markets are marking time, more or less, in the midst of a sluggish season. There is the general run of routine business, but the aggregate volume is not large. Steel manufacturers are hopeful of an upturn in the demand for wire products toward the end of July and in other lines when the new Federal works relief program gains momentum. Improvement in pig iron orders is also dependent on this program, from the standpoint of new pipe tonnage. The pipe melt in the last two months has sagged with the dwindling of old PWA projects.

Before the end of the present week another blast furnace is scheduled to be stopped, further reducing the active total in this district to six. This will be a loss of four in the past three weeks, three being as a result of the closing of the Ensley rail mill. The furnace to be taken off production is No. 1 of the Republic Steel Corpn., which for some time past has been on high silicon. Republic will still have one active stack on foundry.

Ingalls Iron Works has been awarded the structural steel for two new Kress stores, one at Anniston, Ala., and the other at Orlando, Fla. The two will require about 675 tons. Ingalls will also furnish about 100 tons for a Georgia highway bridge near Brunswick. Virginia Bridge & Iron Co. has booked 235 tons for a store at Miami, Fla.

Open-hearth operations are unchanged, with six units being worked. Four are at Fairfield and two at Alabama City.

Copper Price Declines to 8c. a Lb.—Tin Advances on Active Demand

Sharp Decrease in World's Visible Supply Brings Tin Buyers into Market—Lead Strong with Increased Interest—Spelter Quiet

NEW YORK, July 2.—After nearly a month of uncertainty at the 9c. level, primary producers of copper finally reduced the price 1c. a lb. to 8c. a lb., delivered Connecticut Valley, on June 27. Bids on Government contracts the day before had revealed price irregularities on the part of some sellers and outside copper was being offered rather freely at lower prices. The reduction brought out some buying, but sales at the 8c. level in the last few days have hardly been up to expectations. First hands seem to be adhering strictly to the new price, but outside copper is available at a slight discount. The trend of the market here seems to depend largely on the European situation. Prices abroad had strengthened somewhat this morning, with electrolytic being offered at 7.35c. to 7.40c. a lb., usual Continental base ports, but it is too early to determine whether or not the upturn will be sustained.

Tin

Publication of tin statistics yesterday, which revealed a sharp decrease in the world's visible supply, brought buyers into the market in a large way. Sales of 700 to 800 tons were the largest in many months and included all positions up to November. Tin plate makers were among the heavy buyers. The stock figures revealed a decline of 2907 tons in the world's visible supply of tin, bringing the total down to 14,383 tons, including about 8000 tons in the buffer pool. Another factor which probably influenced buyers was the comparatively wide disparity between prices on spot and future metal, but this situation has been largely corrected in both London and New York. Prices on spot tin naturally tended higher in the face of heavier demand and Straits metal at New York was quoted today at 51.87½c. a lb. At London, standard tin was quoted at £229 15s. for spot and £225 2s. 6d. for futures, while Straits metal was available at £238 15s. The Singapore price was £229 12s. 6d. United States deliveries in June amounted to 4615 tons, compared with 3950 tons in May and with 3845 tons in June, 1934. In the first half of the year deliveries amounted to 28,390 tons, compared with 22,445 tons in the first half of 1934.

Lead

Demand for lead during the past week has been the best in more than a month. Buyers seem to have discarded the uncertainty caused by the NRA collapse and practically all of the principal consuming industries were represented in recent sales. Prices remain very firm at 3.85c., St. Louis, and 4.00c., New York, and the leading interest is now booking its entire intake at 3.90c., St. Louis, and 4.10c., New York. The lead ore market is firm at $38 to $40 a ton.

Zinc

The market is slightly more active, but still dull when compared with other metals. Sales last week amounted to about 3700 tons, mostly for July delivery, and consumers are showing little interest in futures, especially beyond August. In the preceding week sales were only 1450 tons. Prices are holding at 4.30c., East St. Louis, and 4.67½c., New York. A few buyers are sounding out the market with attractive tonnages at lower levels, but no shading has been reported. Concentrates are unchanged at $27 for flotation and $28 for mill grades. Sales last week amounted to 5600 tons and shipments at 8600 tons.

Non-Ferrous Averages

The average prices of the major non-ferrous metals for June, based on daily quotations in THE IRON AGE, are as follows:

	Average
Electrolytic copper, N. Y.‡	8.63c. a lb.
Lake copper, Eastern delivery	9.005c. a lb.
Straits tin, spot, N. Y.	51.08c. a lb.
Zinc, East St. Louis	4.298c. a lb.
Zinc, New York	4.673c. a lb.
Lead, St. Louis	3.87c. a lb.
Lead, New York	4.02c. a lb.

‡Price ¼c. higher in Connecticut Valley.

The Week's Prices. Cents Per Pound for Early Delivery

	June 26	June 27	June 28	June 29	July 1	July 2
Electrolytic copper, N. Y.*	8.75	7.75	7.75	7.75	7.75	7.75
Lake copper, N. Y.	9.12½	8.12½	8.12½	8.12½	8.12½	8.12½
Straits tin, spot, New York	51.62½	51.75	51.80	....	51.75	51.87½
Zinc, East St. Louis	4.30	4.30	4.30	4.30	4.30	4.30
Zinc, New York†	4.67½	4.67½	4.67½	4.67½	4.67½	4.67½
Lead, St. Louis	3.85	3.85	3.85	3.85	3.85	3.85
Lead, New York	4.00	4.00	4.00	4.00	4.00	4.00

*Refinery quotations; price ¼c. higher delivered in Connecticut.
†Includes emergency freight charge.

Aluminum, virgin 99 per cent plus, 19c. to 21c. a lb., delivered.
Aluminum, No. 12 remelt, No. 2 standard, in carloads, 16.25c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 12.75c. a lb., New York.
Brass ingots, commercial 85-5-5-5, 8c. a lb., delivered; in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	52.75c. to 53.75c.
Tin, bar	54.75c. to 55.75c.
Copper, Lake	9.25c. to 10.00c.
Copper, electrolytic	9.00c. to 9.50c.
Copper, castings	8.75c. to 9.75c.
*Copper sheets, hot-rolled	15.00c.
*High brass sheets	13.62½c.
*Seamless brass tubes	15.37½c.
*Seamless copper tubes	15.25c.
*Brass rods	12.12½c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.50c. to 5.60c.
Lead, bar	5.50c. to 6.50c.
Lead, sheets	7.75c.
Antimony, Asiatic	13.50c. to 14.50c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	29.50c. to 30.50c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	55.50c.
Tin, bar	57.50c.
Copper, Lake	9.00c.
Copper, electrolytic	9.00c.
Copper, castings	8.25c.
Zinc, slabs	5.75c. to 6.00c.
Lead, American pig	4.65c. to 5.00c.
Lead, bar	5.00c.
Antimony, Asiatic	15.00c.
Babbitt metal, medium grade	19.25c.
Babbitt metal, high grade	59.50c.
Solder, ½ and ½	32.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy, crucible	5.62½c.	6.37½c.
Copper, hvy. and wire	5.50c.	6.00c.
Copper, light and bottoms	4.50c.	5.00c.
Brass, heavy	3.00c.	3.62½c.
Brass, light	2.25c.	3.00c.
Hvy. machine composition	4.87½c.	5.37½c.
No. 1 yel. brass turnings	4.00c.	4.50c.
No. 1 red brass or compos. turnings	4.25c.	4.75c.
Lead, heavy	2.87½c.	3.25c.
Zinc	2.25c.	2.62½c.
Cast aluminum	10.62½c.	11.75c.
Sheet aluminum	12.00c.	13.50c.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel — *Base per Lb.*

F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
F.o.b. Duluth	1.95c.
Del'd Detroit	1.95c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
Del'd Philadelphia	2.11c.
Del'd New York	2.15c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Rail Steel

(For merchant trade)

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25c.

Billet Steel Reinforcing

(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing

(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron

F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	2.10c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.70c.

Cold Finished Bars and Shafting*

Base per Lb.

F.o.b. Pittsburgh	1.95c.
F.o.b. Chicago	2.00c.
F.o.b. Gary	2.00c.
F.o.b. Cleveland	2.00c.
F.o.b. Buffalo	2.05c.
Del'd Detroit	2.15c.
Del'd eastern Michigan	2.20c.

* In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

Angle Line Posts

Base per Net Ton

F.o.b. Pittsburgh	$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston, Orange, Beaumont, Galveston	59.00
F.o.b. Mobile	58.00
F.o.b. New Orleans, Lake Charles, Corpus Christi	59.00
F.o.b. cars dock Pacific ports	63.00

Plates

Base per Lb.

F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
Del'd Cleveland	1.995c.
F.o.b. Coatesville	1.90c.
F.o.b. Sparrows Point	1.90c.
Del'd Philadelphia	1.99c.
Del'd New York	2.09c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.
Wrought iron plates, f.o.b. P'gh	3.20c.

Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

Base per Lb.

F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
Del'd Cleveland	1.995c.
F.o.b. Buffalo	1.90c.
F.o.b. Bethlehem	1.90c.
Del'd Philadelphia	2.015c.
Del'd New York	2.0625c.
F.o.b. Birmingham (standard)	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Steel Sheet Piling

Base per Lb.

F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

Base per Lb.

No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.16c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. dock cars Pacific ports	2.40c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.71c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. dock cars Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila.	2.81c.
No. 10 gage, f.o.b. Birmingham	2.65c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.10c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.26c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 24, f.o.b. dock cars Pacific ports	3.50c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.41c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24, f.o.b. dock cars Pacific ports	3.70c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.40c.
F.o.b. Gary	3.50c.
F.o.b. cars dock Pacific ports	4.10c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.10c.
No. 20, f.o.b. Gary	3.20c.
No. 20, f.o.b. Birmingham	3.70c.
No. 20, f.o.b. cars dock Pacific ports	3.70c.
No. 10, f.o.b. Pittsburgh	2.50c.
No. 10, f.o.b. Gary	2.60c.
No. 10, f.o.b. Birmingham	3.10c.
No. 10, f.o.b. cars dock Pacific ports	3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock Pacific Coast ports	3.35c.

Tin Plate

Per Base Box

Standard cokes, f.o.b. P'gh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate

(*F.o.b. Pittsburgh*)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

Base per Lb.

All widths up to 24 in., P'gh	1.85c.
All widths up to 24 in., Chicago	1.95c.
All widths up to 24 in., del'd Detroit	2.05c.
All widths up to 24 in., Birmingham	2.00c.
Cooperage stock, Pittsburgh	2.10c.
Cooperage stock, Chicago	2.20c.

Cold-Rolled Strips

Base per Lb.

F.o.b. Pittsburgh	2.60c.
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.895c.
F.o.b. Worcester	2.80c.

Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

Hot-Rolled Rail Steel Strips

Base per Lb.

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade — *Per Lb.*

Bright wire	2.30c.
Spring wire	2.90c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

Base per Keg

Standard wire nails	$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10

Base per 100 Lb.

Annealed fence wire	$2.45
Galvanized fence wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	3.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh, while Pacific Coast prices are $8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are $11 a ton above Pittsburgh.

On staples and barbed wire, prices of $6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

Wire Hoops, Twisted or Welded

Off List

F.o.b. Pittsburgh	35 and 2½ off
F.o.b. Chicago	35 off

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

F.o.b. Pittsburgh only on wrought iron pipe

Butt Weld

Steel Inches	Black	Galv.	Wrought Iron Inches	Black	Galv.
⅛	+51½	+29½	⅛	+91½	+133
¼ to ⅜	+53½	+35	¼ & ⅜	+1½	+21½
½	+58½	+47	½	+31½	+15
¾	+62	+52	¾	+36½	+20½
1 to 3	+64	+55	1 & 1¼	+39½	+25½
			1½	+43½	+28
			2	+41½	+26

Lap Weld

2	+60	+51	2	+37	+22½
2½ to 3	+63	+54	2½ to 3½	+38	+25
3½ to 6	+65	+56	4 to 8	+40	+28½
7 and 8	+64	+54	9 to 12	+38	+24½
9 and 10	+63½	+53½			
11 and 12	+62½	+52½			

Butt Weld, extra strong, plain ends

⅛	+48½	+33½	⅛	+13	+45½
¼ to ⅜	+51	+38	¼ & ⅜	+2½	+34½
½	+56½	+47½	½	+32½	+17½
¾	+61	+52	¾	+37½	+22½
1 to 3	+63	+55	1 to 2	+43½	+29

Lap Weld, extra strong, plain ends

2	+58	+50	2	+40	+26
2½ to 3	+62	+54	2½ to 4	+45½	+33
3½ to 6	+65½	+57½	4½ to 6	+45	+33½
7 and 8	+64½	+54½	7 & 8	+46	+33
9 and 10	+63½	+53½	9 to 12	+41½	+30
11 and 12	+62½	+52½			

On standard steel pipe an extra 5% off is allowed on sales to consumers while two 5's off apply on sales to jobbers. On less-than-carload shipments prices are determined by adding 20 and 25% and the carload freight rate to the base card. On structural steel pipe the base card is reduced 2 points and two 5's off are allowed to consumers and three 5's off to jobbers.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 8.60	$7.82
1¼ in. o.d.	13 B.W.G.	10.19	9.26
1½ in. o.d.	13 B.W.G.	11.26	10.23
1¾ in. o.d.	13 B.W.G.	12.81	11.64
2 in. o.d.	13 B.W.G.	14.35	13.04
2¼ in. o.d.	13 B.W.G.	16.00	14.54
2½ in. o.d.	12 B.W.G.	17.61	16.01
2¾ in. o.d.	12 B.W.G.	19.29	17.54
2¾ in. o.d.	12 B.W.G.	20.45	18.59
3 in. o.d.	12 B.W.G.	21.45	19.50
3½ in. o.d.	10 B.W.G.	41.08	37.35
3½ in. o.d.	11 B.W.G.	27.09	24.62
4 in. o.d.	10 B.W.G.	33.60	30.54
4½ in. o.d.	10 B.W.G.	41.08	37.35
5 in. o.d.	9 B.W.G.	51.56	46.87
6 in. o.d.	7 B.W.G.	79.15	71.96

Extras for less-carload quantities:

25,000 lb. or ft. to 39,999 lb. or ft.	5 %
12,000 lb. or ft. to 24,999 lb. or ft.	12½ %
6,000 lb. or ft. to 11,999 lb. or ft.	25 %
2,000 lb. or ft. to 5,999 lb. or ft.	35 %
Under 2,000 lb. or ft.	50 %

Lapweld Steel and Knobbled Charcoal Iron Pressure Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

		Steel	Iron
1½ in o.d.	13 B.W.G.	$ 9.72	$20.16
1¾ in. o.d.	13 B.K.G.	11.06	21.84
2 in. o.d.	13 B.W.G.	12.38	17.23
2¼ in. o.d.	13 B.W.G.	13.79	19.58
2½ in. o.d.	12 B.W.G.	16.58	24.19
2¾ in. o.d.	12 B.W.G.	17.54	26.46
3 in. o.d.	12 B.W.G.	18.35	28.39
3¼ in. o.d.	11 B.W.G.	21.56	33.95
3½ in. o.d.	11 B.W.G.	23.15	36.16
4 in. o.d.	10 B.W.G.	28.66	45.36
4½ in. o.d.	10 B.W.G.	35.22	50.48
5 in. o.d.	9 B.W.G.	44.25	61.86
6 in o.d.	7 B.W.G.	68.14	102.46

Quantity Extras:

40,000 lb or ft.	base
25,000 lb. or ft. to 39,999 lb. or ft.	plus 5%
10,000 lb. or ft. to 24,999 lb. or ft.	plus 12½ %
2,000 lb. or ft. to 9,999 lb. or ft.	plus 25%
Under 2,000 lb. or ft.	plus 40%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago	$48.40
*4-in., del'd Chicago	51.40
6-in. and larger, del'd New York	45.20
4-in. del'd New York	48.20
*6-in. and larger, Birmingham	40.00
*4-in. Birmingham	43.00

Class "A" and gas pipe, $3 extra.

*Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is £39, Birmingham, and $47.40, delivered Chicago, and 4-in. pipe, $42. Birmingham, and $50.40 a ton, delivered Chicago.

RAILROAD MATERIALS

Rails and Track Supplies

F.o.b. Mill

Standard rails, heavier than 60 lb. per gross ton	$36.37½
Angle bars, per 100 lb	2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$35.00
Light rails (from rail steel) per gross ton	34.00

Base per 100 Lbs.

Spikes, 9/16 in. and larger	$2.40
Spikes, ½ in .and smaller	2.40
Tie plates, steel	1.90
Tie plates, Pacific Coast ports	2.00
Track bolts, to steam railroads	3.55
Track bolts, no jobbers, all sizes (per 100 count)	70 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Buffalo, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; on spikes alone, Cleveland, Youngstown, Lebanon, Pa., Columbia, Pa., Richmond, Va.

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	70, 10 and 5
Carriage bolts	70, 10 and 5
Lag bolts	70, 10 and 5
Plow bolts, Nos. 1, 2, 3 and 7 heads	70, 10 and 5
Hot-pressed nuts, blank or tapped, square	70, 10 and 5
Hot-pressed nuts, blank or tapped, hexagons	70, 10 and 5
C.p.c. and t. square or hex. nuts, blank or tapped	70, 10 and 5
Semi-finished hexagon nuts, U.S.S. and S.A.E., all sizes to and incl. 1 in. diameter	70, 10 and 5
Larger than 1 in. diameter	70
Stove bolts in packages, Pittsburgh	75
Stove bolts in packages, Chicago	75
Stove bolts in packages, Cleveland	75
Stove bolts in bulk, Pittsburgh	83
Stove bolts in bulk, Chicago	83
Stove bolts in bulk, Cleveland	83
Tire bolts	60 and 5

Large Rivets

(½-in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh or Cleveland	$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	85 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	87½
Upset set screw, cut and oval point	80
Milled studs	65 to 65 and 10

Alloy and Stainless Steel

Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Uncropped ..... $40 per gross ton

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $49 a gross ton.

Alloy Steel Bars

Price del'd Detroit is $52.

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base ..... 2.45c.
Delivered price at Detroit is ..... 2.60c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (½ Nickel)	$0.25
2100 (1¼% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.70
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo. 2.95c. base per lb.

STAINLESS STEEL No. 302

(17 to 19% Cr. 7 to 9% Ni. 0.08 to 0.20% C.)

(Base Prices f.o.b. Pittsburgh)

	Per Lb.
Forging billets	19.55c.
Rerolling slabs	15c.
Bars	23c.
Plates	26c.
Structural shapes	23c.
Sheets	33c.
Hot-rolled strip	20½c.
Cold-rolled strip	27c.
Drawn wire	23c.

Raw and Semi-Finished Steel

Carbon Steel Rerolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.
Uncropped ..... $29 per gross ton

Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham.
Uncropped ..... $31 per gross ton

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.

	Per Gross Ton
Rerolling	$27.00
Forging quality	32.00

Delivered Detroit

Rerolling	$30.00
Forging	35.00

Billets Only F.o.b. Duluth

Rerolling	$29.00
Forging	34.00

Sheet Bars

Fo.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$28.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

Tube Rounds

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
F.o.b. Birmingham	1.95c.

Wire Rods

(Common, base)

	Per Gross Ton
F.o.b. Pittsburgh	$38.00
F.o.b. Cleveland	38.00
F.o.b. Chicago	39.00
F.o.b. Anderson, Ind.	39.00
F.o.b. Youngstown	39.00
F.o.b. Worcester, Mass.	40.00
F.o.b. Birmingham	41.00
F.o.b. San Francisco	47.00
F.o.b. Galveston	44.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	$19.50	$20.00	$19.00	$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	....	....	19.00	....
Sparrows Point, Md.	19.50	....	19.00	....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	20.75
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	....
Duluth, Minn.	19.00	19.00	....	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17.50	....	17.00	....

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District From Everett, Mass.	$20.00	$20.50	$19.50	$21.00
Brooklyn From East. Pa.	21.9289	22.4289	21.9289	22.9289
Newark or Jersey City, N. J. From East. Pa.	20.9873	21.4873	20.4873	21.9873
Philadelphia From Eastern Pa.	20.3132	20.8132	19.8132	21.3132
Cincinnati From Hamilton, Ohio	19.5807	19.5807	19.0807	20.0807
Canton, Ohio From Cleveland and Youngstown	19.3402	19.3402	19.3402	20.3402
Columbus, Ohio From Hamilton, Ohio	20.64	20.64	....	....
Mansfield, Ohio From Cleveland and Toledo	20.3832	20.3832	....	....
Indianapolis From Hamilton, Ohio	20.9289	20.9289	....	....
South Bend, Ind. From Chicago	20.6935	20.6935	....	....
Milwaukee From Chicago	19.57	19.57	....	....
St. Paul From Duluth	20.94	....	....	....
Davenport, Iowa From Chicago	20.3832	20.3832	....	....
Kansas City From Granite City	21.2178	21.2178	....	....

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. $32.50

GRAY FORGE PIG IRON

Valley furnace	$18.00
Pittsburgh district furnace	18.00

CHARCOAL PIG IRON

Lake Superior furnace	$21.00
Delivered Chicago	24.2528
Delivered Buffalo	24.57

CANADA

Pig Iron

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

	Per Gross Ton
Domestic, 80% (carload)	$385.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$34.00
50-ton lots 3-mo. shipment	34.00
F.o.b. New Orleans	36.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$22.75	12%	$29.25
7%	23.75	13%	30.75
8%	24.75	14%	32.25
9%	25.75	15%	33.75
10%	26.75	16%	35.25
11%	27.75	17%	36.75

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$27.75	14%	$33.25
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 1½ to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W. del., carloads	$1.35 to $1.45
Ferrotungsten, less carloads	1.45 to 1.55
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del. per lb. contained V.	$1.70 to $2.90
Ferrocarbontitanium, 15 to 18% Ti, 6 to 8% C, f.o.b. furnace carload and contract per net ton	$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	$8.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del. 95c.	
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.a.b. furnace, car lots	$38.00
Ton lots or less per ton	45.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	90.00
2% carbon grade	97.50
1% carbon grade	105.00
Spot prices	$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel.	$11.50 to $12.00
No. 2 heavy melting steel.	10.00 to 10.50
No. 2 railroad wrought....	11.50 to 12.00
Scrap rails	13.00 to 13.50
Rails, 3 ft. and under....	13.50 to 14.00
Compressed sheet steel ...	11.25 to 11.75
Hand bundled sheet steel..	10.00 to 10.50
Hvy. steel axle turnings..	10.00 to 10.50
Machine shop turnings....	8.00 to 8.50
Short shov. turnings	8.00 to 8.50
Short mixed borings and turnings	6.25 to 6.75
Cast iron borings	6.25 to 6.75
Cast iron carwheels	12.00 to 12.50
Heavy breakable cast	11.50 to 12.00
No. 1 cast	13.00 to 13.50
Railr. knuckles and coupiers	14.25 to 14.75
Rail, coil and leaf springs	14.25 to 14.75
Rolled steel wheels	14.25 to 14.75
Low phos. billet crops	15.00 to 15.50
Low phos. sheet bar crops.	14.25 to 14.75
Low phos. plate scrap	14.00 to 14.50
Low phos. punchings	14.00 to 14.50
Steel car axles	14.25 to 14.75

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$9.75 to $10.25
Automobile hvy. melt. steel	9.25 to 9.75
Shoveling steel	9.75 to 10.25
Hydraulic comp. sheets ...	8.75 to 9.25
Drop forge flashings	7.75 to 8.25
No. 1 busheling	8.25 to 8.75
Rolled carwheels	11.00 to 11.50
Railroad tires	12.00 to 12.50
Railroad leaf springs	11.00 to 11.50
Axle turnings	8.75 to 9.25
Steel couplers and knuckles	11.00 to 11.50
Coil springs	12.25 to 12.75
Axle turnings (elec. fur.).	9.25 to 9.75
Low phos. punchings	13.00 to 13.50
Low phos. plates, 12 in. and under	13.00 to 13.50
Cast iron borings	5.00 to 5.50
Short shoveling turnings..	5.00 to 5.50
Machine shop turnings....	5.25 to 5.75
Rerolling rails	11.00 to 11.50
Steel rails, less than 3 ft.	11.50 to 12.00
Steel rails, less than 2 ft.	13.00 to 13.50
Angle bars, steel	12.00 to 12.50
Cast iron carwheels	10.50 to 11.00
Railroad malleable	12.00 to 12.50
Agricultural malleable ...	9.50 to 10.00

	Per Net Ton
Iron car axles	$14.50 to $15.00
Steel car axles	13.00 to 13.50
No. 1 railroad wrought ...	7.75 to 8.25
No. 2 railroad wrought ...	8.75 to 9.25
No. 2 busheling	4.50 to 5.00
Locomotive tires, smooth...	10.00 to 10.50
Pipe and flues	5.00 to 5.50
No. 1 machinery cast	9.00 to 9.50
Clean automobile cast	8.50 to 9.00
No. 1 railroad cast	8.00 to 8.50
No. 1 agricultural cast	8.00 to 8.50
Stove plate	6.00 to 6.50
Grate bars	5.50 to 6.00
Brake shoes	6.00 to 6.50

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel.	*$9.50 to $10.50
No. 2 heavy melting steel.	*8.50 to 9.50
No. 1 railroad wrought	10.00 to 10.50
Bundled sheets	9.50 to 10.00
Hydraulic compressed, new	9.50 to 10.00
Hydraulic compressed, old.	7.00 to 7.50
Machine shop turnings....	6.00 to 6.50
Heavy axle turnings	8.50 to 9.00
Cast borings	5.00 to 5.50
Stove plate (steel works)..	8.00 to 8.50
Heavy breakable cast	10.50 to 11.00
No. 1 low phos. heavy ..	13.75 to 14.25
Couplers and knuckles ...	13.50 to 14.00
Rolled steel wheels	13.50 to 14.00
No. 1 blast furnace	4.75 to 5.00
Spec. iron and steel pipe..	8.50 to 9.00
Shafting	17.00 to 17.50
Steel axles	..... to 16.00
No. 1 forge fire	9.50 to 10.00
Cast iron carwheels	11.00 to 11.50
No. 1 cast	11.00 to 11.50
Cast borings (chem.)	10.50 to 13.00
Steel rails for rolling ...	12.00 to 12.50

* Brokers' buying price for export.

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 heavy melting steel.	$7.75 to $8.25
No. 2 heavy melting steel.	6.25 to 6.75
Scrap rails for melting....	7.75 to 8.25
Loose sheet clippings	4.25 to 4.75
Bundled sheets	5.75 to 6.25
Cast iron borings	4.25 to 4.75
Machine shop turnings	4.25 to 4.75
No. 1 busheling	5.75 to 6.25
No. 2 busheling	2.50 to 3.00
Rails for rolling	8.75 to 9.25
No. 1 locomotive tires	7.00 to 7.50
Short rails	11.25 to 11.75
Cast iron carwheels	7.75 to 8.25
No. 1 machinery cast	9.00 to 9.50
No. 1 railroad cast	8.25 to 8.75
Burnt cast	5.75 to 6.25
Stove plate	5.75 to 6.25
Agricultural malleable ...	7.75 to 8.25
Railroad malleable	8.75 to 9.25

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel.	$9.50 to $10.00
No. 2 heavy melting steel.	9.00 to 9.50
Compressed sheet steel ...	9.00 to 9.50
Light bundled sheet stampings	7.50 to 8.00
Drop forge flashings	8.50 to 9.00
Machine shop turnings....	6.25 to 6.75
Short shoveling turnings..	6.50 to 7.00
No. 1 busheling	8.50 to 9.00
Steel axle turnings	9.00 to 9.50
Low phos. billet crops	14.00 to 14.50
Cast iron borings	6.50 to 7.00
Mixed borings and short turnings	6.50 to 7.00
No. 2 busheling	6.50 to 7.00
No. 1 cast	11.00 to 11.50
Railroad grate bars	7.00 to 7.50
Stove plate	7.50 to 8.00
Rails under 3 ft.	13.50 to 14.00
Rails for rolling	15.50 to 18.00
Railroad malleable	12.50 to 13.00
Cast iron carwheels	10.75 to 11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel.	$10.75
No. 2 heavy melting scrap	9.75
Scrap rails	11.00
New hydraul. comp. sheets	9.75
Old hydraul. comp. sheets.	8.75
Drop forge flashings	9.75
No. 1 busheling	9.75
Hvy. steel axle turnings..	$8.00 to 8.50
Machine shop turnings ...	4.50 to 5.00
Knuckles and couplers ...	11.50 to 12.00
Coil and leaf springs	11.50 to 12.00
Rolled steel wheels	11.50 to 12.00
Low phos. billet crops ..	12.00 to 12.50
Short shov. steel turnings.	6.00 to 6.50
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
No. 2 busheling	6.50
Steel car axles	11.50 to 12.00
Iron axles	11.50 to 12.00
No. 1 machinery cast	11.50 to 12.50
No. 1 cupola cast	10.50 to 11.00
Stove plate	9.00 to 9.50
Steel rails, 3 ft. and under	12.50 to 13.00
Cast iron carwheels	11.00 to 11.50
Industrial malleable	12.00 to 13.00
Railroad malleable	12.00 to 13.00
Chemical borings	8.00 to 8.50

BOSTON

Dealers' buying prices per gross ton:

*No. 1 heavy melting steel	$8.50 to $8.75
No. 1 heavy melting steel	6.15 to 6.65
*Scrap T rails	8.50 to 9.00
Scrap rails	6.40 to 6.65
*No. 2 steel	7.50 to 7.75
No. 2 steel	5.15 to 5.65
Breakable cast	5.25 to 5.50
Machine shop turnings ...	2.40 to 2.50
*Machine shop turnings (short)	4.50
Bundled skeleton, long ...	4.50 to 5.00
Forge flashings	5.00 to 5.50
Shafting	11.75 to 12.00
Steel car axles	11.50 to 12.00
Cast iron borings, chemical	6.50 to 7.00
*Stove plate	6.25 to 6.50

Per gross ton delivered consumers' yards:

Textile cast	$9.00 to $9.50
No. 1 machinery cast	9.00 to 9.50
Stove plate	6.00 to 6.50
Railroad malleable	11.00 to 11.50

* Delivered local army base.

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel.	*$7.00 to †$8.50
No. 2 heavy melting steel.	*5.50 to †7.50
Heavy breakable cast	6.00 to 6.50
No. 1 machinery cast	7.00 to 7.50
No. 2 cast	†6.25
Stove plate	6.25
Steel car axles	13.50 to 14.00
No. 1 railroad wrought ...	7.00 to 7.50
No. 1 yard wrought, long.	6.00 to 6.50
Spec. iron and steel pipe..	4.50 to 5.00
Forge fire	5.50 to 6.00
Rails for rolling	8.50 to 9.00
Short shoveling turnings ..	2.00 to 2.50
Machine shop turnings ...	2.00 to 2.50
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical) ..	11.00 to 11.50
Unprepared yard iron and steel	4.00 to 4.50

Per gross ton, delivered local foundries:

No. 1 machinery cast	$10.00
No. 1 hvy. cast (cupola size)	9.00
No. 2 cast	7.50

* For direct car loading only.
† Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$9.00 to $9.50
Scrap steel rails	10.00 to 10.50
Short shoveling turnings ..	.... 7.00
Stove plates	.... 7.00
Steel axles	.... 11.50
Iron axles	.... 11.50
No. 1 railroad wrought ...	.... 7.00
Rails for rolling	.... 12.50
No. 1 cast	9.50 to 10.00
Tramcar wheels	.... 10.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$8.75 to $9.25
No. 1 heavy melting	8.25 to 8.75
No. 2 heavy melting	7.50 to 8.00
No. 1 locomotive tires ...	9.75 to 10.25
Misc. stand-sec. rails ...	9.75 to 10.25
Railroad springs	11.00 to 11.50
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought..	8.25 to 8.75
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	3.00 to 3.50
Rails for rolling	10.00 to 10.50
Machine shop turnings ..	2.75 to 3.25
Heavy turnings	5.50 to 6.00
Steel car axles	12.50 to 13.00
Iron car axles	15.00 to 16.00
No. 1 railroad wrought ...	6.00 to 6.50
Steel rails less than 3 ft.	11.50 to 12.00
Steel angle bars	9.50 to 10.00
Cast iron carwheels	8.00 to 8.50
No. 1 machinery cast	8.50 to 9.00
Railroad malleable	10.50 to 11.00
No. 1 railroad cast	8.00 to 8.50
Stove plate	6.50 to 7.00
Agricult. malleable	8.50 to 9.00

DETROIT

Dealers' buying prices per gross ton:

Heavy melting steel	$7.50 to $8.00
Borings and short turnings	4.25 to 4.75
Long turnings	$3.75 to $4.25
No. 1 machinery cast	11.00 to 11.50
Automotive cast	11.25 to 11.75
Hydraul. comp. sheets	8.00 to 8.50
Stove plate	6.50 to 7.00
New factory busheling....	6.50 to 7.00
Old No. 2 busheling	3.75 to 4.25
Sheet clippings	4.75 to 5.25
Flashings	7.00 to 7.50
Low phos. plate scrap	7.50 to 8.00

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$7.00
Rails scrap	8.00	8.00
Machine shop turnings ...	3.00	3.00
Boiler plate	4.50	4.50
Heavy axle turnings	4.50	4.00
Cast borings	4.00	3.50
Steel borings	2.00	2.00
Wrought pipe	3.50	3.50
Steel axles	7.00	8.00
Axles, wrought iron	7.00	8.00
No. 1 machinery cast	9.00	9.00
Stove plate	5.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

	Per Gross Ton
Old range, Bessemer, 51.50% iron...	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron..	4.50
High phosphorus, 51.50% iron.....	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algeria	9.50c.
Iron, low phos., Swedish, average 68½% iron	9.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52%	26c.
Manganese, African, Indian, 44-48%	21c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48½%	20c.

	Per Net Ton Unit
Tungsten, Chinese, wolframite, duty paid, delivered*	$17.50 to $18.50
Tungsten, domestic, scheelite, delivered†	17.00

	Per Gross Ton
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	$17.00
Chrome, 48%, Cr_2O_3, c.i.f. Atlantic Seaboard	20.00

* Quotations nominal in absence of sales.
† Nominal; no supplies available.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines for all-rail shipment	$13.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	16.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	14.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$3.35 to $3.60
Foundry, f.o.b. Connellsville Prompt	4.00 to 5.10
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, cel'd	9.24 to 9.72
Foundry, by-product, Phila.	9.03
Foundry, by-product, Cleveland, delivered	9.25
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines.....	$1.45 to $1.65
Mine run coking coal, f.o.b. W. Pa.	1.75 to 1.95
Gas coal, ¾-in., f.o.b. Pa. mines	1.85 to 2.35
Mine run gas coal, f.o.b. Pa. mines	1.75 to 1.95
Steam slack, f.o.b. W. Pa mines	1.15 to 1.35
Gas slack, f.o.b. W. Pa. mines	1.20 to 1.45

Fuel Oil

	Per Gal. f.o.b. Bayonne, N. J.
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

	Per Gal. f.o.b. Baltimore
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

	Per Gal. del'd Chicago
No. 3 industrial fuel oil.....	3.88c.
No. 5 industrial fuel oil.....	3.38c.

	Per Gal. f.o.b. Cleveland
No. 3 distillate	5.50c.
No. 4 industrial	5.25c.
No. 5 industrial	4.25c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	45.00	40.00
New Jersey	55.00	45.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago District	54.00
Birmingham	55.00
Silica clay, per net ton	8.00

Chrome Brick

	Per Net Ton
Standard, f.o.b. Baltimore, Plymouth Meeting and Chester, Pa..	$45.00
Chemically Bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	42.50

Magnesite Brick

	Per Net Ton
Standard, f.o.b. Baltimore and Chester, Pa.	$65.00
Chemically Bonded, f.o.b. Baltimore	55.00

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa.	$45.00
Domestic, f.o.b. Baltimore and Chester	40.00
Domestic, f.o.b. Chewelah, Wash...	22.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	2.15c.
Structural shapes	2.15c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.90c.
Cold-finished and screw stock:	
Rounds and hexagons	3.20c.
Squares and flats	3.20c.
Hoops and bands under ¼ in.	3.20c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.30c.
Galv. sheets (No. 24), 25 or more bundles	3.95c.
Hot-rolled sheets (No. 10)	2.95c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.69
Spikes, large	2.90c.
Track bolts, all sizes, per 100 count, 65 per cent off list.	
Machine bolts, 100 counts, 65 per cent off list.	
Carriage bolts, 100 count, 65 per cent off list.	
Nuts, all styles, 100 count, 65 per cent off list.	
Large rivets, base per 100 lb.	$3.50
Wire, black, soft ann'l'd, base per 100 lb.	*2.70
Wire, galv. soft, base per 100 lb.	*2.925
Common wire nails, per keg	*2.834
Cement coated nails, per keg	*2.834

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.

*Delivered in Pittsburgh switching district.

CHICAGO

	Base per Lb.
Plates and structural shapes	2.20c.
Soft steel bars	2.95c.
Cold-fin. steel bars:	
Rounds and hexagons	3.35c.
Flats and squares	3.35c.
Hot-rolled strip	3.30c.
Hot-rolled annealed sheets (No. 24)	3.85c.
Galv. sheets (No. 24)	4.55c.
Hot-rolled sheets (No. 10)	3.05c.
Spikes (keg lots)	3.50c.
Track bolts (keg lots)	4.65c.
Rivets, structural (keg lots)	3.65c.
Rivets, boiler (keg lots)	3.75c.
	Per Cent Off List
Machine bolts	*70
Carriage bolts	*70
Lag screws	*70
Hot-pressed nuts, sq. tap. or	
Hot-pressed nuts, sq. tap or blank	*70
Hot-pressed nuts, hex. tap or	
Hot-pressed nuts, hex. tap or blank	*70
Hex. head cap screws	60
Cut point set screws	70 and 10
Flat head bright wood screws	37½ and 10
Spring cotters	50
Stove bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$4.50 off list
Black ann'l'd wire per 100 lb.	$3.85
Com. wire nails, base per keg	2.95†
Cement c't'd nails, base per keg	2.95†

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

*These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 65 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b., Chicago, with full or partial freight allowed up to 50c. per 100 lb.

†Prices for city and suburbs only.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	2.40c.
Structural shapes	2.37c.
Soft steel bars, small shapes	2.26c.
Iron bars	3.26c.
Iron bars, swed. charcoal	6.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.81c.
Flats and squares	4.31c.
Cold-rolled; strip, soft and quarter hard	3.36c.
Hoops	3.56c.
Bands	3.56c.
Hot-rolled sheet (No. 10)	3.31c.
Hot-rolled ann'l'd sheets (No. 24*)	3.89c.
Galvanized sheets (No. 24*)	4.50c.
Long terne sheets (No. 24)	5.20c.
Standard tool steel	11.90c.
Wire, black annealed (No. 10)	3.40c.
Wire, galv. (No. 10)	3.75c.
Tire steel, 1 x ⅛ in. and larger	3.65c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base, per keg	$3.21
	Per Cent
Machine bolts, cut thread:	Off List
All diameters	65 and 10
Carriage bolts, cut thread:	
All diameters	65 and 10
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.45c.
Bars, soft steel or iron	3.20c.
Cold-fin. rounds, shafting, screw stocks	3.75c.
Hot-rolled annealed sheets (No. 24)	4.10c.
Galv. sheets (No. 24)	4.65c.
Hot-rolled sheets (No. 10)	3.30c.
Black corrug. sheets (No. 24)	4.10c.
*Galv. corrug. sheets	4.65c.
Structural rivets	4.00c.
Boiler rivets	4.10c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts: All quantities	70

*No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	2.98c.
*Structural shapes	2.98c.
*Soft steel bars, small shapes, iron bars (except bands)	2.93c.
‡Reinforc. steel bars, sq. twisted and deformed	2.96c.
Cold-finished steel bars	3.61c.
*Steel hoops	3.43c.
*Steel bands, No. 12 and 3/16 in., incl.	3.18c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	3.65c.
†Galvanized sheets (No. 24)	4.30c.
*Hot-rolled annealed sheets (No. 10	3.08c.
Diam. pat. floor plates, ¼ in.	4.95c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.31c.
Soft steel bars	2.95c.
Reinforc. steel bars	2.10c.
Cold-finished steel bars	3.25c.
Flat-rolled steel under ¼ in.	3.36c.
Cold-finished strip	†3.00c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.61c.
Hot-rolled sheets (No. 10)	3.11c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c.
Black ann'l'd wire, per 100 lb.	$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

†Outside delivery 10c. less.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.42c.
Bars, soft steel or iron	3.17c.
New billet reinforc. bars	3.25c.
Rail steel reinforc. bars	3.25c.
Hoops and bands, 3/16 in. and lighter	3.47c.
Cold-finished bars	3.57c.
Hot-rolled annealed sheets (No. 24)	4.02c.
Galv. sheets (No. 24)	4.72c.
Hot-rolled sheets (No. 10)	3.22c.
Structural rivets	4.35c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$2.88
Com. wire nails, base per keg:	
Any quantity less than carload	3.04
Cement c't'd nails, base 100-lb. keg	3.50
Chain, 1-in., per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$21.67
4-in.	51.19
Lap-welded steel boiler tubes, 2-in.	30.62
4-in.	48.19

BUFFALO

	Base per Lb.
Plates	3.35c.
Struc. shapes	3.35c.
Soft. steel bars	3.00c.
Reinforcing bars	2.60c.
Cold-fin. flats and sq.	3.40c.
Round and hex.	3.40c.
Cold-rolled strip steel	3.19c.
Hot-rolled annealed sheets (No. 24)	4.06c.
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.63c.
Galv. sheets (No. 24)	4.70c.
Bands	3.43c.
Hoops	3.43c.
Heavy hot-rolled sheets	3.13c.
Com. wire nails, base per keg	$3.35
Black wire, base per 100 lb. (2500-lb. lots or under)	3.55
(Over 2500 lb.)	3.45

BOSTON

	Base per Lb.
Reams, channels, angles, tees, zees	3.54c.
H beams and shapes	3.54c.
Plates—sheered, tank and univ. mill, ¼ in. thick and heavier	3.56c.
Floor plates, diamond pattern	5.36c.
Bar and bar shapes (mild steel)	3.35c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.65c. to 4.65c.
Half rounds, half ovals, ovals and bevels	4.60c.
Tire steel	4.60c.
Cold-rolled strip steel	3.345c.
Cold-finished rounds, squares and hexagons	3.90c.
Cold-finished flats	3.75c.
Blue annealed sheets, No. 10 ga.	3.65c.
One pass cold-rolled sheets No. 24 ga.	4.20c.
Galvanized steel sheets, No. 24 ga.	4.90c.
Lead coated sheets, No. 24 ga.	5.85c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

	Base per Lb.
Soft steel bars	3.04c.
Structural shapes	3.42c.
Plates	3.42c.
Floor plates	5.17c.
Hot-rolled annealed sheets (No. 24)	3.94c.
Hot-rolled sheets (No. 10)	3.14c.
Galvanized sheets (No. 24)	4.72c.
Bands	3.39c.
Hoops	3.39c.
Cold-finished bars	3.49c.
Cold-rolled strip	3.18c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	5.22c.*
Bolts and nuts	70 and 5 per cent off list

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials.

* Price applies to 1,000 lb. and over.

MILWAUKEE

	Base per Lb.
Plates and structural shapes	3.31c.
Soft steel bars	3.06c.
Hot-rolled strip	3.41c.
Hot-rolled sheets (No. 10)	3.16c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.66c.
Cold-finished steel bars	3.61c.
Cold-rolled strip	3.30c.
Structural rivets (keg lots)	3.86c.
Boiler rivets (keg lots)	3.96c.
Track spikes (keg lots)	3.71c.
Track bolts (keg lots)	4.86c.
Black annealed wire	3.10c.
Com. wire nails	2.90c.
Cement coated nails	2.90c.
	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Hot-pressed nuts, sq. and hex., tapped or blank (keg lots)	70

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on order of 400 to 3499 lb. On cold-finished bars the prices are for orders of 300 to 499 lb.

ST. PAUL

	Base per Lb.
Mild steel bars	3.20c.
Structural shapes	3.45c.
Plates	3.45c.
Cold-finished bars	3.87c.
Bands and hoops	3.55c.
Hot-rolled annealed sheets, No. 24	3.90c.
Galvanized sheets, No. 24	4.50c.
Cold-rolled sheets, No. 20	4.95c.

On mild steel bars, shapes, plates and hoops and bands the base applies on 400 to 14,999 lb. On cold-finished bars, hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over.

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.55c.	3.60c.	3.55c.
Shapes, standard	3.55c.	3.60c.	3.55c.
Soft steel bars	3.60c.	3.60c.	3.60c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.45c.	2.45c.	2.45c.
Hot-rolled annealed sheets (No. 24)	4.40c.	4.35c.	4.40c.
Hot-rolled sheets (No. 10)	3.75c.	3.70c.	3.75c.
Galv. sheets (No. 24)	5.00c.	4.95c.	5.00c.
Cold finished steel: Rounds	5.95c.	5.85c.	6.00c.
Squares and hexagons	7.20c.	7.10c.	7.25c.
Flats	7.70c.	7.60c.	8.25c.
Common wire nails —base per keg less carload	$3.30	$3.40	$3.30

All items subject to differentials for quantity.

TOOL STEEL

Prices are same for warehouse distribution at all points on or East of Mississippi River. West of Mississippi quotations are 1c. a lb. higher.

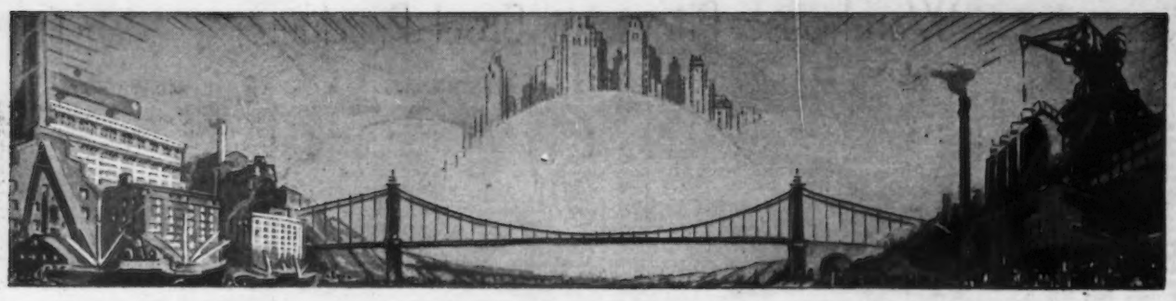
	Base per Lb.
High speed	57c.
High carbon chrome	37c.
Oil hardening	22c.
Extra	17c.
Regular	14c.

Weekly Indications of Steel Activity

From THE IRON AGE

	July 2, 1935	June 25, 1935	June 4, 1935	July 3, 1934	Average, Year to Date 1935	1934
Steel ingot operations—Per cent of capacity	32.0	38.0	41.5	21.0	45.9	47.5

	Week Ended				Year to Date	
	July 2, 1935	June 25, 1935	June 4, 1935	July 3, 1934	1935	1934
Fabricated structural steel awards	7,000	27,000	5,700	10,550	361,552	436,920
Fabricated plate awards	2,475	1,620	5,600	2,315	58,172	76,912
Sheet steel piling awards	0	1,220	600	1,000	23,365	24,240
Reinforcing bar awards	4,400	3,000	2,455	2,150	112,755	110,885



Plant Expansion and Equipment Buying

Automotive Buying and Increased Foreign Purchases Help Machine Tool Market

MACHINE tool purchases by Ford, Chrysler and the General Motors subsidiaries have given the market added life during the last week. Chevrolet still has a large buying program in prospect and Pontiac has just taken bids on a number of tools. The Electromotive Corpn. has bought the heavier tools for its Diesel locomotive plant to be located in the Chicago district and will take action soon on the lighter equipment. The International Harvester Co. has issued a tentative inquiry for $70,000 worth of tools for its Milwaukee plant.

The Amtorg Trading Corpn. is placing large orders in this country in connection with the development of the Soviet automobile industry. During the first three weeks of June, purchases of lathes and other tools amounted to about $3,000,000. Orders for light tools have also been placed by firms in England and Italy.

◀ NORTH ATLANTIC ▶

Eastern Terminal Corpn., 4312 Vernon Boulevard, Long Island City, has approved plans for new bulk oil storage and distributing plant. Cost about $50,000 with steel tanks and other equipment.

Joseph E. Seagram & Sons, Inc., 405 Lexington Avenue, New York, distiller, has organized Julius Kessler Distilling Co., Inc., a new subsidiary, headed by Julius Kessler as president. New interest will operate at Lawrenceburg, Ind., where parent organization has a distillery. Expansion will be carried out at latter plant, including six story addition, 150 x 200 ft., primarily for storage and distribution, for which general contract has been let to J. & E. Warm Co., 2330 Florence Avenue, Cincinnati. Cost about $400,000 with equipment.

American Oil Co., 122 East Forty-second Street, New York, has let general contract to J. S. Packard Dredging Co., 1 Court Street, Boston, for new bulk oil storage and distributing plant at East Greenbush, near Troy, N. Y., where waterfront site has been selected, to include dock and water terminal facilities. Cost over $200,000 with steel tanks and other equipment, pumping station, etc.

Department of Parks, Arsenal, Central Park, New York, has taken out permit for two new one-story equipment maintenance and repair buildings, each 36 x 88 ft., at Pelham Bay Park, Bronx. Aymar Embury, 2d, 150 East Sixty-first Street, is architect.

Signal Supply Officer, Army Base, Brooklyn, asks bids until July 15 for 700 legs for radio sets (Circular 166).

Quartermaster, Fort H. G. Wright, New York, plans new hangar building, garage and service building, and equipment warehouse. Appropriation of $47,935 is being arranged.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 9 for high-speed steel twist drills (Schedule 5443), for Brooklyn Navy Yard; six motor-driven engine lathes and spare parts (Schedule 5419); until July 12, electric switches, receptacles, plugs, etc. (Schedule 5411), for Brooklyn, Philadelphia and Charleston yards; nine fire extinguishing systems and spare parts (Schedule 5403), for Brooklyn, Norfolk, Charleston and other yards; four ½-ton and two ¼-ton motor-operated hoists and spare parts (Schedule 5436), for Brooklyn and Charleston yards.

Board of Education, Newburgh, N. Y., plans manual training department in new two-story junior high school. Fund of $500,000 is being arranged through Federal aid. Starrett & Van Vleck, 287 Fifth Avenue, New York, are architects.

Fritzsche Brothers, Inc., 82 Beekman Street, New York, essential oils, chemicals, etc., has leased 75,000 sq. ft. in Port Authority Commerce Building, 111 Eighth Avenue, for new compounding, storage and distributing plant. Clinton & Russell, 70 Pine Street, architects, will prepare plans for interior installation.

United States Engineer Office, First District, New York, closes bids July 9 (postponed from July 2), for eight gasoline shovels, each ½-cu. yd. capacity (Circular 359).

Quartermaster, Raritan Arsenal, Raritan Township, N. J., plans new one-story equipment storage and distributing building. Cost about $30,000; also extensions and improvements in present storage and distributing buildings to cost $84,852. Appropriations are being arranged.

State Department of Institutions and Agencies, State Office Building, Trenton, N. J., plans new power plant at local State hospital. Cost over $75,000 with equipment. Fund of $407,500 is being arranged through Federal aid for this and other work at institution. H. A. Kelly, address noted, is architect.

Board of Education, Essex County Vocational Schools, Hall of Records, Newark, N. J., Robert O. Beebe, director, is considering shop addition to boys' vocational school at Bloomfield, N. J. Cost $366,000 with equipment; also additions in boys' vocational schools at Newark and Irvington, to cost $180,000 and $678,125 with equipment respectively.

Quartermaster Depot, Twenty-first and Johnston Streets, Philadelphia, asks bids until July 11 for 100,000 bar iron rods and 100,000 clamps for T-bars for cots (Circular 395).

Philco Radio & Television Corpn., Tioga and C Streets, Philadelphia, plans early rebuilding of No. 6 plant, Allegheny Avenue, recently destroyed by fire. Loss about $400,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 9 for metal aircraft blades and propeller hubs (Schedule 5444), for Philadelphia Navy Yard; electrical measuring instruments (Schedule 5426), for Philadelphia, Anacostia and San Diego yards.

◀ BUFFALO DISTRICT ▶

Binghamton Gas Co., Binghamton, N. Y., has let general contract to J. M. Knowlton Co., 201 Robinson Street, for one-story addition to service and equipment building. Cost close to $45,000 with equipment. Conrad & Cummings, 99 Collier Street, are architects.

Franklin Motors, Inc., 302 Geddes Street, Syracuse, N. Y., John E. Williams, president, organized a few months ago to take over plant and property of Franklin Automobile Co., bankrupt, is arranging for early production of new model automobiles, including parts production and assembling, scheduled to be placed on market next fall.

Board of Education, Ogdensburg, N. Y., plans manual training department in new multi-story junior high school. Cost about $150,000 with equipment. Randall & Vedder, S. A. & K. Building, Syracuse, N. Y., are architects.

◀ WESTERN PA. DIST. ▶

American Austin Car Co., Butler, Pa., closed for several months, is being acquired by new interests, headed by R. S. Evans, president of Evans Motors Co., Atlanta, Ga., and American Finance & Motors Corpn., same city. New owners will make extensions and improvements for production of new type of small automobile. Cost over $300,000 with equipment.

United States Engineer Office, Huntington, W. Va., asks bids until July 26 for new roller gate dam on Kanawha River, near Winfield, W. Va., comprising five standard type and one crest-flap type roller gates, 26 ft. high and 100 ft. wide, to be operated by electric hoists.

Board of Works, Huntington, W. Va., plans new municipal incinerator in South Side district. Cost over $80,000 with equipment. One-story storage and equipment

HEAPING
A new book, showing what a manufacturer should know about Bonderizing, is available. It includes charts showing the results of various tests of painted steel samples. Send for your copy.

VALUES ARE MAKING SALES IN 1935

THE plants that are running overtime are the plants that give a "heaping" measure of quality. New ideas, improvements, full measure of value are the keys that are unlocking consumers' pocketbooks.

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NATIONAL FORGE AND ORDNANCE CO.

IRVINE, WARREN COUNTY, PENNA., U. S. A.

building will also be erected. Frampton & Bowers, 414 Eleventh Street, are architects for latter structure.

OHIO AND INDIANA

Harris Calorific Co., 2828 Washington Avenue, N. W., Cleveland, manufacturer of gas welding and cutting torches and kindred products, will occupy new one-story plant, 100 x 235 ft., at 5500 Cass Avenue, N. W., recently attributed to David Archbold, previous owner of plant site, in these columns. Superstructure will soon begin by Gillmore-Carmichael-Olson Co., 1873 East Fifty-fifth Street, general contractor. Harris company will vacate present factory on completion of new unit. Cost about $100,000 with equipment. Ernest McGeorge, 2969 Euclid Heights Boulevard, is architect and engineer.

Lynchburg Distillery Co., Lynchburg, Ohio, will soon begin an expansion and reconditioning program at distillery, with installation of new equipment. Cost close to $200,000 with machinery.

Blanchard Rural School District, Blanchard, Ohio, plans manual training shop in two-story and basement addition to Dunkirk school. Cost about $50,000. W. W. Burk, Forest, Ohio, is architect.

Youngstown Alloy Casting Corpn., Youngstown, Ohio, has been organized by George D. and J. Trantin, Jr., 103 East Indianola Avenue, to manufacture a line of alloy steel and other metal castings.

City Council, St. Marys, Ohio, plans extensions and improvements in municipal electric light and power plant, including new turbo-generator unit, boilers and auxiliary equipment. Cost about $185,000 with machinery. Financing is being arranged through Federal aid.

Contracting Officer, Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until July 17 for indicator assemblies, bank and turn type, in lots of 600 and 1000 (Circular 812).

Contracting Officer, Quartermaster Corps, Jeffersonville, Ind., asks bids until July 11 for twist drills, machinists' hammers, striking hammers, woodworkers' chisels, grindstones, garden rakes, carpenters' mallets, levels and plumbs and other tools (Circular 122).

Rock City Foundry Co., Inc., South Carroll Street, Wabash, Ind., has been organized by E. F. Mattern, 278 West Maple Street, and associates, to manufacture iron and other metal castings.

Trabon Engineering Corpn., Detroit, manufacturer of lubricating equipment, will move to Cleveland where it has leased part of American Multigraph Building, East Fortieth Street and Kelly Avenue, N. E. E. J. Hill is president.

NEW ENGLAND

Shelton Tack Co., Shelton, Conn., manufacturer of tacks, nails, etc., has plans for second story addition on present one-story building, 40 x 100 ft. Cost over $25,000 with equipment. Leo F. Caproni, 742 Elm Street, New Haven, Conn., is architect and engineer.

Board of Education, Westbrook, Me., W. S. Ellingwood superintendent of schools, plans manual training department in new two-story and basement high school. Cost about $175,000. Financing has been arranged through Federal aid. Bunker & Savage, 256 Water Street, Augusta, Me., are architects.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 9 for one 10,000-lb. drop forge hammer for Boston Navy Yard (Schedule 5453).

United Welding & Machine Co., Inc., New Haven, Conn., has been organized by Joseph A. Charland, West Haven, Conn., and associates, to manufacture machinery and parts, and operate a general machine and welding works.

Department of Schools, 11 Beacon Street, Boston, plans manual training department in new multi-story intermediate school in Washington Irving District, Roslindale, for which bids will be asked soon on general contract. Cost about $800,000 with equipment. Sturgis Associates, Inc., 120 Boylston Street, is architect.

Pacific Oil Co., Central Street, Fall River, Mass., has plans for new bulk oil storage and distributing plant. Cost over $45,000 with steel tanks and other equipment. S. T. Dubitsky, 38 Third Street, is architect.

Valley Diesel Engine Co., Springfield, Mass., has been organized by Perley A. Meron and C. George Leveillee, 910 Longmeadow Street, Longmeadow, Mass., to manufacture Diesel engines and parts.

SOUTH ATLANTIC

Lee County Packing Co., Fort Myers, Fla., has let general contract to S. J. Robinson & Son, Haines City, Fla., for rebuilding fruit canning and packing plant recently destroyed by fire. Cost close to $100,000 with machinery.

Common Council, Sanford, N. C., plans new municipal electric light and power plant, including transmission and distributing lines. Cost about $300,000 with equipment. Financing will be arranged through Federal aid.

Automatic Coal Fireman, Inc., Asheville, N. C., has been organized by L. E. Addington, Asheville, and associates, to manufacture automatic stokers and parts for domestic service.

Fort Gaines Consolidated School District, Fort Gaines, Ga., has plans for new one-story vocational school, 50 x 120 ft. Cost over $65,000 with equipment. Daniel & Beutell, Georgia Saving Bank Building, Atlanta, Ga., are architects.

G. & J. Maxcy Packing Co., Avon Park, Fla., plans rebuilding part of fruit canning and packing plant recently destroyed by fire. Loss over $80,000 with machinery.

SOUTH CENTRAL

Coffey Distilling Co., Fisherville, Ky., J. R. Coffey, 515 Juanita Street, Louisville, secretary, has approved plans for new distillery at first noted place. Cost over $90,000 with machinery.

Board of Education, Madisonville, Ky., plans manual training department in new two-story high school. Cost about $125,000. H. E. Boyle & Co., Evansville, Ind., are architects.

Lookout Oil & Refining Co., Chattanooga, Tenn., manufacturer of vegetable oil products, affiliated with Armour & Co., Chicago, has begun expansion and improvements, including new oil-refining machinery and accessories, hydrogen gas producer equipment and other machinery. Cost over $250,000.

Marlow Coal Co., Defiance, near Hazard, Ky., plans rebuilding coal tipple at mining properties, recently destroyed by fire. Loss about $40,000 with machinery.

Brown Stove Works, Inc., Cleveland, Tenn., recently formed by Grover C. Brown, Cleveland, and associates, with capital of $200,000, has engaged Sears & Shephard, James Building, Chattanooga, Tenn., architects, to prepare plans for new plant at first noted place, where about 15 acres has been secured. It will consist of one-story unit for foundry, pattern shop, assembling and mounting, storage and distribution. Cost over $85,000 with equipment.

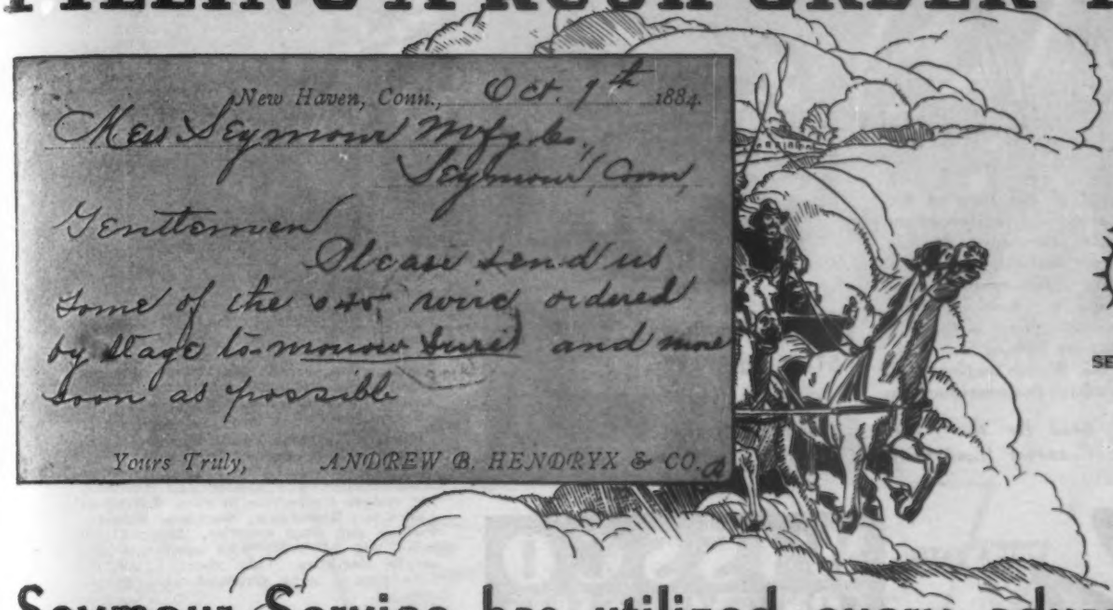
City Council, Greenwood, Miss., has called special election to approve bonds for $192,000 for extensions and improvements in municipal electric light and power plant, including new equipment; also for improvements in waterworks and sewage system. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

MICHIGAN DISTRICT

Stroh Brewery Co., 909 East Elizabeth Street, Detroit, has asked bids on general contract for five-story and basement addition, 100 x 120 ft. Cost over $175,000 with equipment. Harley & Ellington, Inc., Stroh Building, is architect and engineer.

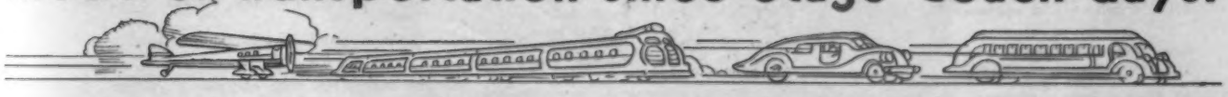
Chrysler Corpn., 341 Massachusetts Avenue, Detroit, has plans for remodeling and improving branch plant at Evansville, Ind., formerly property of Dodge Brothers Corpn., Hamtramck, Mich. Buildings will be extended and re-equipped for manufacture of Plymouth automobiles, instead of motor truck production, as heretofore. Cost about $1,000,000 with machinery. Work is scheduled for completion late in fall. Briggs Mfg. Co., 11631 Mack Avenue, Detroit, will occupy one of plant units at Evansville, for production of bodies for Plymouth cars. Chrysler Corpn. has asked bids on general contract for one-story top addition to branch plant at Highland Park, Mich. Cost over $75,000 with equipment. Albert Kahn, Inc., New Center Building,

FILLING A "RUSH ORDER" in 1884!


New Haven, Conn., Oct. 1st 1884.
Mess Seymour Mfg Co.,
Seymour, Conn.
Gentlemen
Please send us
some of the 6x6 wire ordered
by Stage to-morrow sure and more
soon as possible
Yours Truly, ANDREW B. HENDRYX & CO.

FOR SERVICE

Seymour Service has utilized every advanced mode of transportation since Stage Coach days!



TO show that prompt service was expected from and rendered by The Seymour Manufacturing Company over fifty years ago, above is a photograph of a rush order received in the early eighties from Andrew B. Hendryx & Company, manufacturers of bird cages.

Back in this hectic period, when the remonetization of silver was street-corner conversation, railroad "wash-outs" were front page news, and airships were only an inventor's dream, "Seymour" could always be depended upon for rush orders, routed fastest possible way. This one crashed through via passenger stage!

With hundreds of orders arriving instead of dozens, Seymour Service is now even more closely geared to the high pressure of its time than it was when Garfield was elected. But, today, instead of a few customers, it has many; instead of a limited number of products it has a wide variety; and instead of merely selling these products and considering the issue closed—often the custom of the eighties—it goes out of its way to deliver satisfaction as well as products of quality. All of which does much to explain why so many manufacturers make "Seymour" their permanent supplier.

SEYMOUR

THE SEYMOUR MANUFACTURING COMPANY, 24 FRANKLIN STREET, SEYMOUR, CONN.

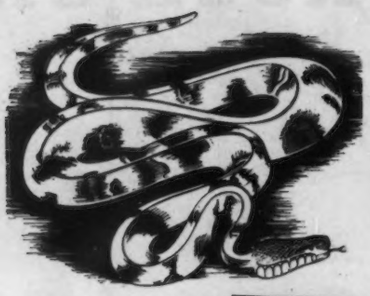
Specialists in

NICKEL SILVER & PHOSPHOR BRONZE

Also manufacturers of "Controlled Grain" Nickel Anodes

balanced spiral belt

is as flexible as a

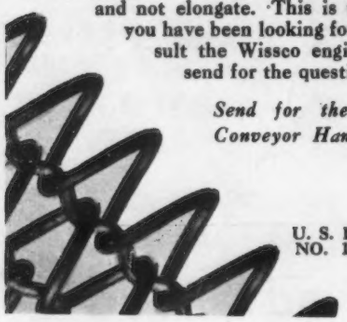


The free movement of the loop of the spiral on the crimped reinforcement member makes this the most flexible woven metal belt yet devised. Other important features are: true running, constant flatness, ability to hold its width and not elongate. This is the belt you have been looking for. Consult the Wissco engineer — send for the questionnaire

Send for the NEW Conveyor Hand Book

WICKWIRE SPENCER STEEL COMPANY

New York City, Worcester, Buffalo, Chicago, San Francisco



U. S. PATENT NO. 1,952,873

WISSCO CONVEYOR BELTS

Detroit, is architect and engineer for last noted work.

United States Graphite Co., Saginaw, Mich., manufacturer of industrial lubricants, etc., has let general contract to Walter W. Qualman, Saginaw, for one-story addition, 67 x 120 ft. Cost over $40,000 with equipment. Frantz & Spence, Saginaw, are architects.

Duv Co., Benton Harbor, Mich., manufacturer of lamp shades, frames, etc., has plans for one-story plant, 60 x 200 ft. Cost about $60,000 with equipment. Wallace Preston, Benton Harbor, is architect.

WASHINGTON DIST.

Procurement Officer, Chemical Warfare Service, Edgewood Arsenal, Md., asks bids until July 8 for 40,880 outlet valve guards (Circular 166); until July 9, 40,880 aluminum angle tubes and 43,000 aluminum elbow nozzles (Circular 168), 1704 gross clinch tips and 83,000 bifurcated rivets (Circular 170).

Baugh & Sons Co., Norfolk, Va., manufacturer of commercial fertilizer products, plans rebuilding part of plant recently destroyed by fire. Loss over $250,000 with equipment. Headquarters are at 20 South Delaware Avenue, Philadelphia.

General Purchasing Officer, Panama Canal, Washington, asks bids until July 8 for rigid track frogs, split switches, locomotive wheel tires, pipe bends, bridge reamers, chucking reamers, reamer arbors, twist drills, stone drills, pipe taps, die stocks, sledge hammers, machinists' hammers, cant hooks, 15,000 ft. of galvanized steel wire cloth, snap switches, toggle switches, hand augur bits and other equipment (Schedule 3068).

Queen City Bread Co., Cumberland, Md., has plans for new one-story baking plant to replace factory recently destroyed by fire, to include traveling ovens, conveyors and other mechanical equipment. Cost about $50,000 with machinery.

Piedmont Label Co., Bedford, Va., plans one-story addition, 100 x 160 ft., to paper converting plant. Cost over $60,000. Bryan & Terhune, 2 Rector Street, New York, are consulting engineers.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 9 for one or two motor-driven spindle type automatic screw and bar machines (Schedule 5446); until July 12, two milling machine dividing heads (Schedule 5465) for Washington yard; until July 9, one motor-driven cut-off metal machine (Schedule 5459), for Norfolk, Va., Navy Yard; until July 12, brass and copper pipe and tubing (Schedule 5430), for Eastern and Western yards; seamless steel tubing (Schedule 5429), for Portsmouth, Va., and Mare Island, Cal., yards.

SOUTHWEST

Sunnen Products Co., 7900 Manchester Avenue, St. Louis, manufacturer of automotive tools and equipment, has let general contract to W. C. Harting Construction Co., 722 Chestnut Street, for two-story addition, 92 x 120 ft. Cost close to $60,000 with equipment. Benjamin C. Elliott, Mexico, Mo., is architect.

International Harvester Co., Third Street, and Rock Island Avenue, Wichita, Kan., has asked bids on general contract for new one-story service, repair, parts and garage building, 97 x 215 ft., for motor truck division. Cost over $100,000 with equipment. Headquarters are at Chicago.

Board of Education, 400 North Walnut Street, Oklahoma City, Okla., plans manual training department in new multi-story high school at Twenty-seventh and Kelley Streets, where site has just been purchased. Cost about $250,000 with equipment. Financing will soon be arranged through Federal aid, and architect selected. J. C. Stearley is clerk of board.

Chamber of Commerce, Silver City, N. M., R. T. Kellogg, secretary, is at head of project to build a local ore reduction plant to handle silver and other fine ores produced in district. Several mining companies will have a financial interest in new plant. Cost about $150,000 with machinery, including mechanical-handling equipment. Financing will be carried out through Federal aid.

State Building Commission, 204 Madison Street, Jefferson City, Mo., Edgar M. Eagan, executive secretary, has plans for two new one-story mechanical shops, each 51 x 65 ft., at Algoa Farms institution, near Jefferson City. Cost over $75,000 with equipment. Charles A. Haskin, Finance Building, Kansas City, Mo., is architect; W. D. Weidlein, Hall Building, Kansas City, is mechanical engineer.

Common Council, Alice, Tex., plans new municipal electric light and power plant and electrical distributing system. Special election will soon be held to vote bonds. Financing will be arranged through Federal aid. Cost close to $100,000 with equipment. R. R. Graham, mayor, is active in project.

Board of Public Service of St. Louis, Baxter Brown, president, plans installation of new boilers and equipment in power plant, and basin alterations to Chain of Rocks pumping station.

MIDDLE WEST

District Commander, Fort Sheridan, Ill., C.C.C., asks bids until July 28 for water tanks and towers for 10 camps (Circular 112).

Paul Gerhardt, 64 West Randolph Street, Chicago, architect and engineer, has plans for new distillery at Gilmer Station, about three miles from Mundelein City, Ill., to be operated by a company now being organized by Edward H. Bluhm, head of the Tripp Lumber Co., Mundelein City, and Joseph P. O'Hern of State Bank of Mundelein, same place. Property has been acquired. Plans will comprise several units, including storage and distributing building, power house and other mechanical departments. Cost close to $200,000 with machinery.

Eastern Nebraska Public Power District, Tecumseh, Neb., care of George W. Kline, 1707 Otoe Street, Lincoln, Neb., secretary, plans electric transmission and distributing system for service in rural district of Lancaster, Richardson, Saunders, Nemaha, Pawnee and other counties. About 11,500 miles will be built, with substation and service facilities. Cost about $2,500,000. Financing is being arranged through Federal aid.

Board of Education, Bellevue, Neb., plans manual training department in new two-story high and grade school. Cost about $100,000. Financing is being arranged through Federal aid. John Latenser & Son, Insurance Building, Omaha, Neb., are architects.

City Council, Jamestown, N. D., plans new municipal electric light and power plant, including distributing lines. Cost about $650,000 with equipment. Financing is being carried out through Federal aid. Pillsbury Engineering Co., 1200 Second Avenue South, Minneapolis, is consulting engineer.

Kraft-Phenix Cheese Corpn., 400 Rush Street, Chicago, has asked bids on general contract for four-story addition to plant at Freeport, Ill., 80 x 120 ft., including one-story top addition to present three-story factory. Cost about $200,000 with machinery.

City Council, Wood River, Ill., is considering new municipal electric light and power plant. Cost over $125,000 with equipment. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Gardner Machine Co., Beloit, Wis., manufacturer of grinders and abrasive tools, is building an addition to abrasives building for installation of two additional ovens, made necessary by demand for grinding wheels. Factory is on full production schedule.

Union Pipe Fitting Co., Union City, Ind., is transferring plant to Fort Atkinson, Wis., where it has leased 5000 sq. ft. from James Mfg. Co., manufacturer of steel barn and stable equipment, steel structures, etc., for farms.

Board of Water Commissioners, Oshkosh, Wis., has adopted improvement and enlargement program at municipal water filtration plant costing about $45,000. Alvord, Burdick & Howson, 20 North Wacker Drive, Chicago, are consulting engineers. Albert E. Hintz is manager of water department.

PACIFIC COAST

Stanislaus Winery, 203 Park Street, Modesto, Cal., J. H. Defosset, head, plans new plant on Golden State Highway, near city, including power house and storage and distributing division. Cost close to $100,000 with equipment.

Valencia High School District, Placentia, Cal., has asked bids on general contract for new one-story manual arts building at local high school. Cost over $45,000 with equipment. T. C. Kistner, Architects' Building, Los Angeles, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until

the Seal!

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NO OTHER FITTINGS OFFER SUCH ECONOMY.. Specify
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Send us your specifications for estimate
THE WEATHERHEAD COMPANY 620-724 Frankfort Avenue, Cleveland, Ohio

July 12 for one motor-driven straight-line cut-off saw (Schedule 5437), for Puget Sound Navy Yard; three 35-lb. capacity carbon dioxide stationary fire extinguishers (Schedule 5424), for Mare Island yard; until July 19, 3000 steel buckets (Schedule 5477), for San Diego naval station.

Yale Oil Co., Idaho Falls, Idaho, C. R. Wildung, representative, has plans for new bulk oil storage and distributing plant. Cost about $40,000 with steel tanks and other equipment. Company headquarters and main refinery are at Yale, Okla.

Construction Service, Veterans' Administration, Arlington Building, Washington, asks bids until July 16 (postponed from June 18), for new electrical transmission line at institution at American Lake, Wash.

City Council, Idaho Falls, Idaho, will soon take bids for equipment for expansion in municipal electric light and power plant. Cost about $45,000. Financing is being arranged through Federal aid.

Standard Oil Co. of California, 225 Bush Street, San Francisco, has organized Standard Oil Co. of British Columbia, Ltd., new Canadian subsidiary, to build a new oil refinery near Vancouver, B. C., where waterfront site is being selected. Cost over $1,000,000 with machinery. Crude oil will be furnished from company wells in California by company-owned tankers. Project will include several storage and distributing terminals for gasoline supply for group of company-owned service stations in British Columbia.

Bureau of Reclamation, Denver, asks bids until July 11 for four switchyard oil storage tanks and two oil sump tanks and auxiliary equipment for Boulder power plant, Boulder Canyon Project, Arizona-California-Nevada (Specification 695-D).

◀ FOREIGN ▶

Fisher & Ludlow, Ltd., Albion Works, Rea Street, Birmingham, England, manufacturer of metal products, plans four-story addition, about 120,000 sq. ft. floor space. Cost over $250,000 with equipment.

Compania Nitro Chimica Brasileira, Ltd., Rio de Janeiro, Brazil, has been organized as a joint interest of Tubize Chatillon Corpn., 2 Park Avenue, New York, and Klabin, Irmaos & Co., Ltd., and S. A. Fabrica Votorantim, both of Rio de Janeiro, to build a new nitro-cellulose rayon mill near last noted city. Plant will consist of several units, with power house, machine shop and other mechanical departments. Part of equipment to be used will be removed from former mill of Tubize Chatillon Corpn., at Hopewell, Va. Cost over $1,500,000 with machinery.

Mutual Pulp & Paper Mills of Prince Rupert, Ltd., Prince Rupert, B. C., recently organized, care of F. L. Buckley, 1030 Hamilton Street, Vancouver, B. C., representative, plans new pulp and paper mill at Seal Cove, Prince Rupert. Power house, pumping plant and machine shop will be built. Entire project will cost over $750,000 with machinery.

Revised Directory of Steel Plants Issued

ESSENTIAL details, so far as reported, of all companies, firms and individuals known to be now engaged in the iron and steel industry in the United States and Canada are contained in the twenty-second edition of the "Directory of Iron and Steel Works of the United States and Canada," which has just been issued by the American Iron and Steel Institute.

The new directory represents a complete revision and bringing up to date of the information published in the 1930 edition. As in previous editions, the main part of the new directory consists of a list of the concerns engaged in the iron and steel industry, with as full details as practicable relative to each.

To facilitate comparisons with earlier editions of the directory, a special list has been included in this edition containing appropriate reference to all concerns which were listed in the 1930 edition but which have since that date gone out of business, been combined with other companies, or changed ownership and corporate name.

Another new feature of this edition appears in the supplementary lists, which show for each of the principal classes of products the name of each producer and its reported capacity. All estimated capacities reported for use in this directory have been related to available steel supply or to actual performance in production. It is believed, therefore, that the data presented in this edition accurately represent the status of the industry as it entered the year 1935.

The new edition contains more than 450 pages. The price per copy, bound in cloth, is $8, postpaid, to members of the institute and to booksellers, and $10, postpaid, to non-members of the institute.

Residential Building Definitely Improved

NEW residential building projects started during May reached the largest dollar total that had been seen in 43 months, according to the F. W. Dodge Corpn., New York. "The encouraging feature of this year's sustained rise in residential building," according to a special bulletin just released by the corporation, "is found in the fact that it has consisted almost entirely of private new construction."

RESIDENTIAL BUILDING CONTRACTS
37 Eastern States
(First Five Months Only)

1931	$418,001,900
1932	139,581,700
1933	85,440,500
1934	105,182,700
1935	158,340,700

Progress in housing recovery in the important cities is traced in the analysis by the Dodge organization.

Residential building awards continued to show encouraging improvement over the totals for 1934 in the first half of June. The volume reported in the 37 eastern States during that period amounted to $25,779,200, almost equal to the total reported for the full month of June, 1934. "Coming on top of a substantial improvement in May the current gain assumes even greater importance," according to Dodge. The May residential contract total was about 6 per cent greater than in April and about 80 per cent ahead of the residential volume recorded for May, 1934.

CUT THE COST OF *Stainless Equipment* BY USING

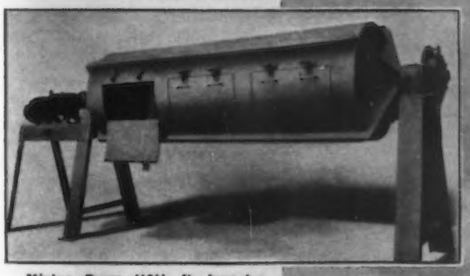
INGACLAD

Trade Mark Reg.

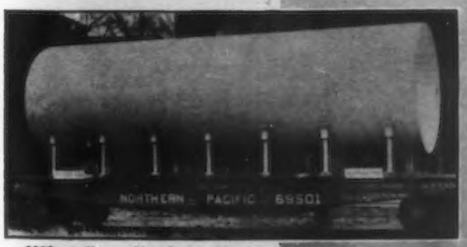
STAINLESS-CLAD STEEL

The shell plates for the main evaporator and auxiliary vessels shown above were fabricated from IngAclad.

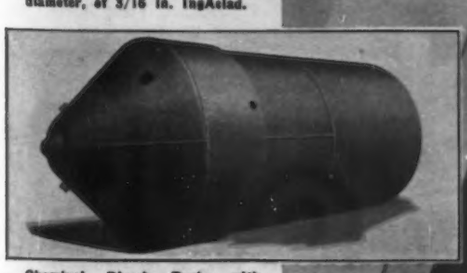
A BORG-WARNER PRODUCT



Mixing Drum (10½ ft. long by 44 in. diameter), fabricated from IngAclad, providing sanitation, corrosion-resistance and economy.



9800-gallon Chemical Storage Tank, 27 ft. long and 8 ft. in diameter, of 3/16 in. IngAclad.



Chemical Bleach Tanks with water-jacketed conical bottoms entirely of all-welded IngAclad construction are used in soap works.

IngAclad is *not* a substitute for stainless steel. It *is* genuine stainless on the side that is used, with a backing of mild carbon steel. You pay for and get perfect stainless service, at a material cost of approximately half that of the solid metal. This new development in steel made possible by the Ingersoll Ingot Patented Process, is recognized as one of the outstanding metal achievements of recent years.

Industry after industry is finding in IngAclad the solution of their equipment problems. In the list of satisfied users, you will find the names of America's most successful producers of chemicals, foods, soaps, etc.

Write for descriptive folder with illustrations showing many of the applications of IngAclad. Fabricators are also invited to write for free copy of "Manual of Welding and Fabricating Procedures."

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Division of Borg-Warner Corporation

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310 South Michigan Avenue, Chicago, Illinois

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816 Folsom St., San Francisco
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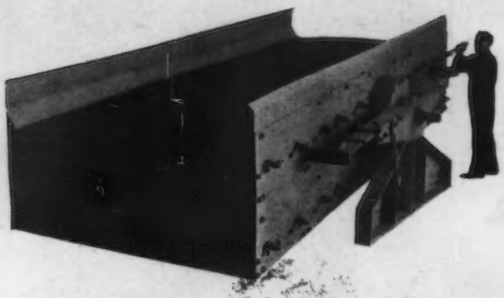
Eastern Representatives:
H. Boker & Co., Inc.,
101-103 Duane St., New York, N. Y.

Ohio Representatives:
The E. W. Buschman Co.,
626 Broadway, Cincinnati, Ohio

Missouri Representative:
Clark P. Schumacher,
3740 Washington Ave., St. Louis, Mo.



SCREENS FOR EVERY INDUSTRY

Every industry has its own particular screening problem . . . every plant in the industry likewise requires a different size and capacity of screen. Because Robins makes them all . . . over a hundred different sizes and types of screens . . . Iron Ore—Coke—Sinter—Stone . . . whatever your screening job is, we can take care of it.

ROBINS PRODUCTS

Belt Conveyors, Portable Conveyors, Feeders, Gates, Conveyor Idlers, Bucket Elevators, Crushers, Screens, Grab Buckets.

ROBINS CONVEYING BELT CO.
15 Park Row, New York City

MATERIAL HANDLING ROBINS EQUIPMENT

SEND FOR DESCRIPTIVE LITERATURE

Fabricated Structural Steel

Awards in Small Volume—New Projects Lower

WITH lettings mostly in small tonnages, bookings total only 7000 tons compared with 27,000 tons last week. An addition to a plant of the Briggs Mfg. Co., requiring 1700 tons, and a building for the Kelsey-Hayes Wheel Corpn., 1160 tons, both at Detroit, are the only awards of size. New projects of 9000 tons compare with 56,675 tons in the previous week and 11,200 tons two weeks ago. The largest new job reported is 4000 tons for a refinery for the Shell Petroleum Corpn. at Houston, Tex. Plate awards call for 2475 tons, with 12,225 tons pending. Locks on the Mississippi River at New Boston, Ill., will require 1100 tons of sheet piling. Structural steel contracts in June totaled 70,815 tons compared with 52,200 tons in May and 60,275 tons in April. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Providence, R. I., 195 tons, addition to mill building, to New England Structural Co.

New York, 540 tons, Rialto Building, to Bethlehem Fabricators, Inc.

Richmond, Staten Island, N. Y., 380 tons, addition to Sea View Hospital, to Ingalls Iron Works Co.

Wilmington, Del., 100 tons, office building, to McClintic-Marshall Corpn.

THE SOUTH

Coal Creek, Tenn., 960 tons, TVA powerplant, to Virginia Bridge & Iron Co.

Anniston, Ala., 170 tons, store for S. H. Kress Corpn., to Ingalls Iron Works Co.

Florida East Coast Railway, 150 tons, bridge at Jupiter, Fla., to McClintic-Marshall Corpn.

Yazoo City, Miss., 325 tons, bridge, to Nashville Bridge Co.

Houston, Tex., 165 tons, storage building, to Mosher Steel Co.

CENTRAL STATES

Cleveland, 295 tons, lintels for the Cedar-Central Federal housing project, to Truscon Steel Co.

South Bend, Ind., 130 tons, infirmary building, to Edwards Iron Works.

Macon County, Ill., 105 tons, beam bridge, to Mississippi Valley Structural Steel Co.

Bay City, Mich., 400 tons, addition for Chevrolet Motor Co., to R. C. Mahon Co.

Detroit, 165 tons, Chrysler Corpn. loading dock, to Whitehead & Kales Co.

Detroit, 1700 tons, Briggs Mfg. Co., factory addition, to Whitehead & Kales Co.

Detroit, 1160 tons, Kelsey-Hayes Co. foundry building, to Wisconsin Bridge Co.

East St. Louis, Ill., 165 tons, coal pocket for Burlington Railroad, to Stupp Brothers Bridge & Iron Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Washington, 200 tons, theater, to be readvertised.

Wilmington, Del., unstated tonnage, post office; tenders due July 22.

Atlantic City, N. J., unstated tonnage, post office; tenders due July 26.

Reading, Pa., 150 tons, high school; drawings will be issued this week.

Meadville, Pa., 900 tons, buildings for Viscose Co.; Work & Co. have general contract.

Wilmington, Del., 165 tons, addition to Elks club; bids are in to Darling Contracting Co.

West Roxbury, Mass., 200 tons, school alterations.

Erie County, N. Y., 100 tons, Leydecker Road bridge, Buffalo fabricator low bidder.

Baltimore, 250 tons, building for Gunther Brewing Co.

SOUTH AND SOUTHWEST

Elliott City, Ky., 310 tons, State highway bridge.

Maricopa County, Ariz., 195 tons, State bridge; Wisconsin Bridge & Iron Co. low bidder.

CENTRAL STATES

Detroit, 1000 tons, Chrysler Corpn. addition to its Plymouth-Mountain Elliott plant.

Elyria, Ohio, 350 tons, building for Western Automatic Machine Screw Co., Ingalls Iron Works Co. low bidder.

New Boston, Ill., 900 tons, lock on Mississippi River.

Wilmington, Ill., 400 tons, Northern Illinois Coal Co.

Elmira, Iowa, 350 tons, factory.

WESTERN STATES

State of Idaho, 275 tons, bridge.

Los Angeles, 850 tons, Grafts building.

Tacoma, Wash., 462 tons, bridge at East Eleventh Street, application has been made for PWA loan.

FABRICATED PLATES

AWARDS

Newark, N. J., 130 tons, fermenters for United States Industrial Alcohol Co., to Buffalo Tank Co.

Houston, Tex., 2225 tons, storage tanks for Shell Petroleum Corpn., to Petroleum Iron Works.

Clarendon, Ark., 120 tons, 160-ft. barge for Choctaw Transportation Co., to St. Louis Ship Building & Steel Co.

NEW PROJECTS

New York, 225 tons to 900 tons, one to four oil barges for American Oil Co.

Spokane, Wash., 12,000 tons, water system extension on east side of Lake Washington; application has been made to PWA for loan.

SHEET PILING

NEW PROJECTS

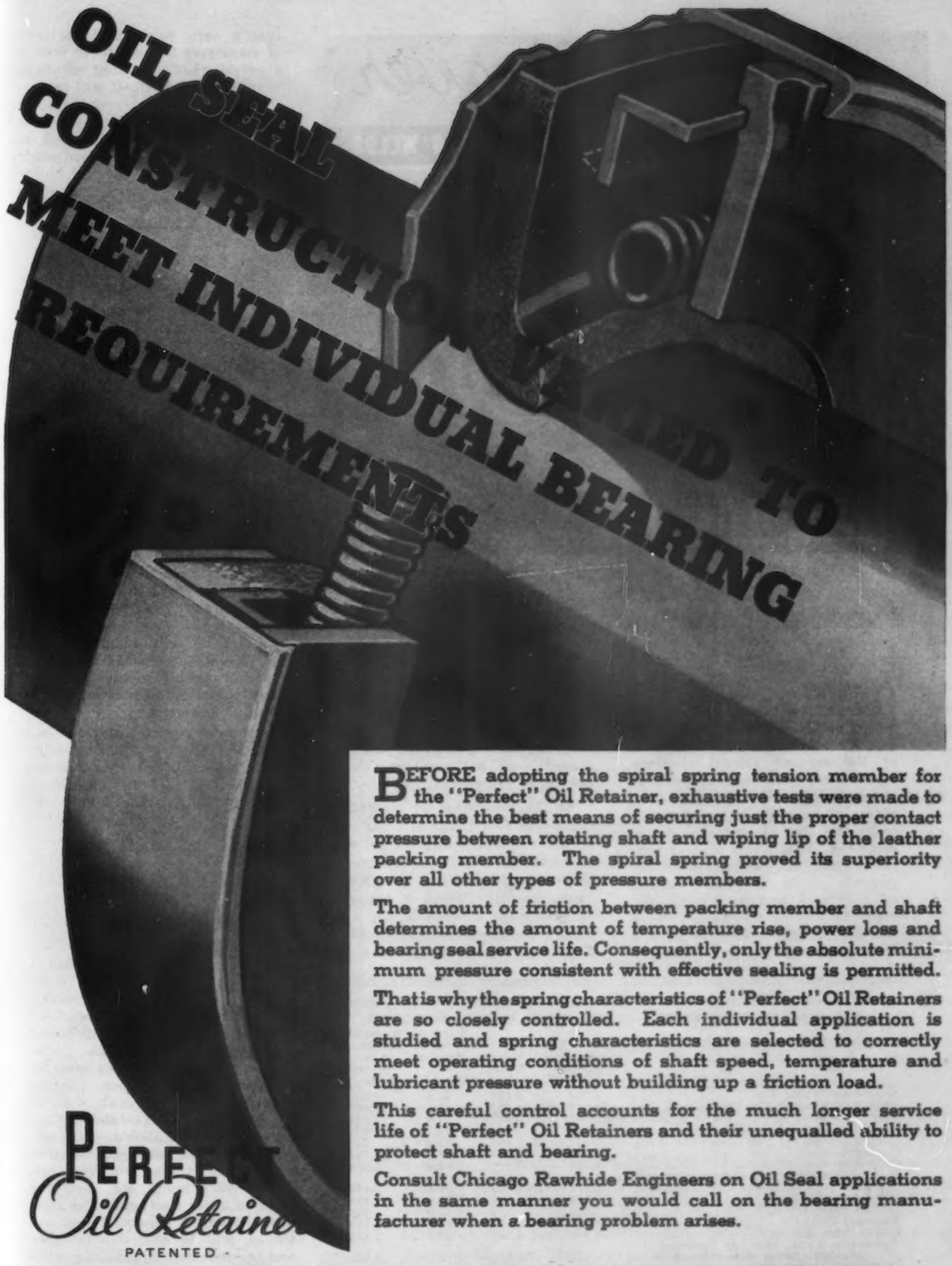
New Boston, Ill., 1100 tons, locks on Mississippi River.

Trade Notes

La Salle Steel Co., Chicago, has appointed A. H. Deveney & Co., Peachtree Arcade Building, Atlanta, Ga., to handle the sale of its products in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North and South Carolina, Tennessee, Virginia and West Virginia. Earl R. Waddell, Fort Worth, Tex., has been placed in charge of company's sales in Oklahoma and Texas, except El Paso.

Carboloy Co., Inc., Detroit, manufacturer of cemented carbide tools and dies, has appointed Hartley Wire Die Co., Waterbury, Conn., as distributer of Carboloy cemented carbide dies.

Standard Fuel Engineering Co., Detroit, has appointed E. B. Packard Co., 30 Church St., New York, as representatives for their Zero refractory cements and allied refractories in New York territory.



BEFORE adopting the spiral spring tension member for the "Perfect" Oil Retainer, exhaustive tests were made to determine the best means of securing just the proper contact pressure between rotating shaft and wiping lip of the leather packing member. The spiral spring proved its superiority over all other types of pressure members.

The amount of friction between packing member and shaft determines the amount of temperature rise, power loss and bearing seal service life. Consequently, only the absolute minimum pressure consistent with effective sealing is permitted.

That is why the spring characteristics of "Perfect" Oil Retainers are so closely controlled. Each individual application is studied and spring characteristics are selected to correctly meet operating conditions of shaft speed, temperature and lubricant pressure without building up a friction load.

This careful control accounts for the much longer service life of "Perfect" Oil Retainers and their unequalled ability to protect shaft and bearing.

Consult Chicago Rawhide Engineers on Oil Seal applications in the same manner you would call on the bearing manufacturer when a bearing problem arises.

PERFECT
Oil Retainer
PATENTED

THE CHICAGO RAWHIDE MANUFACTURING COMPANY

1306 ELSTON AVENUE • CHICAGO, ILLINOIS

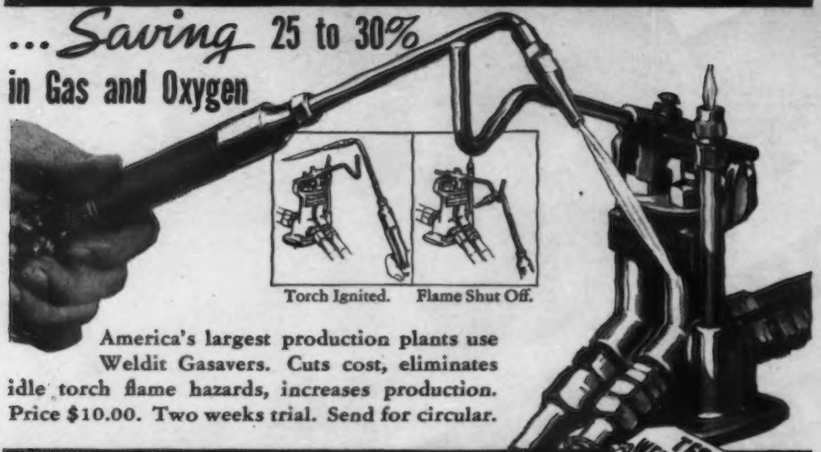
53 YEARS MANUFACTURING QUALITY MECHANICAL LEATHER GOODS EXCLUSIVELY

NEW YORK PHILADELPHIA PITTSBURGH DETROIT CLEVELAND CINCINNATI BOSTON

WELDIT Gasaver

AUTOMATICALLY SHUTS OFF FLAME BETWEEN WELDS

...Saving 25 to 30% in Gas and Oxygen



America's largest production plants use Weldit Gasavers. Cuts cost, eliminates idle torch flame hazards, increases production. Price $10.00. Two weeks trial. Send for circular.

WELDIT ACETYLENE CO. 641 BAGLEY AVE. DETROIT, MICH.

TEST THIS WELDIT GASAVER FREE FOR TWO WEEKS IN YOUR PLANT

No Non-Employees Chosen in Elections at Steel Corpn. Plants

BASED upon advices received from employee committees, the United States Steel Corpn. this week made public the results of the regular annual elections which have been held throughout the past month at the various plants of its subsidiary companies under the plan of employee representation. Under this plan of representation all employees on the payrolls (with the exception of officials and persons having the right to hire or discharge) have the opportunity to vote for anyone they may wish to have represent them, regardless of whether such representative may or may not be employed by the company. In the nominations and elections just concluded none but employees were chosen as representatives.

At the conclusion of all balloting it was found that 87.1 per cent of all employees eligible to vote under the plan had cast ballots and elected representatives of their own choosing. Details of the vote by employees of each of the subsidiary companies are given herewith, from which it will be noted that a very substantial majority of employees turned out to vote in a period when operating schedules were at a low level. It will be further observed that interest in the plan was so keen that more than 8000 employees who were not at work on the day of election made special journeys from their homes to the polling places to record their choice.

RESULTS OF ELECTIONS FOR EMPLOYEE REPRESENTATIVES, SUBSIDIARY COMPANIES OF UNITED STATES STEEL CORPN., JUNE, 1935

Company	Number Eligible to Vote	Total Votes Cast	Per Cent of Number of Eligibles	Number of Employees at Work on Day of Election
American Bridge Co	3,666	3,151	85.9	3,033
American Sheet & Tin Plate Co	23,677	21,030	88.8	19,968
American Steel & Wire Co	17,387	16,411	94.4	14,654
(Cyclone and Standard Fence)	432	407	94.2	396
Carnegie Natural Gas Co	395	365	92.4	351
Carnegie Steel Co	26,596	23,579	88.6	20,744
Columbia Steel Co	3,712	3,190	85.9	3,454
H. C. Frick Coke Co. (where plan is in effect)	3,636	3,128	86.0	3,493
Illinois Steel Co	21,772	16,971	77.9	15,838
Lorain Steel Co	1,055	919	87.0	948
National Tube Co	15,990	14,835	92.8	13,279
Oliver Iron Mining Co	4,703	4,099	87.0	2,862
Tennessee Coal, Iron & Railroad Co. (Manufacturing departments only)	8,228	6,415	78.0	6,950
Universal Atlas Cement Co. (except Northampton and Waco plants, where elections occur later)	2,121	1,679	79.2	1,773
Total	133,370	116,179	87.1	107,743

Blast Furnace Added At Buffalo

BUFFALO, July 2. — Republic Steel Corpn. has placed another furnace in blast, and, on Aug. 1 the Tonawanda Iron Corpn. is scheduled to start a long idle stack. Bethlehem's Lackawanna plant is operating two blast furnaces, and Hanna Furnace Corpn., two.

Nine open-hearths are active at Lackawanna, three at Republic, and one at Wickwire-Spencer. The Seneca sheet division of Bethlehem is operating at about 70 per cent.

A few small fabricated structural jobs around 15 to 20 tons have been let; a Buffalo fabricator is understood to be low on a 100-ton county bridge. Award of the 255 tons of reinforcing bars for the William and Ogden Streets grade crossing improvement for the Erie Railroad has been made to a Buffalo concern.

Scrap circles are interested in a new sale reported to a Buffalo interest, which bought No. 1 heavy melting steel at $10.75 and No. 2 heavy melting steel at $9.75. Between 5000 and 6000 tons was involved.

Steel Labor Board Is Continued

WASHINGTON, July 2.— The National Steel Labor Board, extended by an executive order Monday, will work in conjunction with the conciliation service of the Department of Labor. This board, together with the Textile Labor Board, extended under the same order, will mediate labor disputes such as will not be dealt with by the new labor board established under the Wagner Labor disputes act, which gives its board authority to handle fair trade practices, collective bargaining, etc., and the right to order elections. The steel labor board, its personnel also continued, will be available to labor and the industry in handling labor relations within its field and will continue a survey of problems affecting those relations. The board is headed by Justice Walter P. Stacy of North Carolina.

The Story of Lukens is the Story of Steel

Despite the misgivings of family and friends, Isaac Pennock, in July of 1810, decided to build his iron mill on the Brandywine at Coatesville.

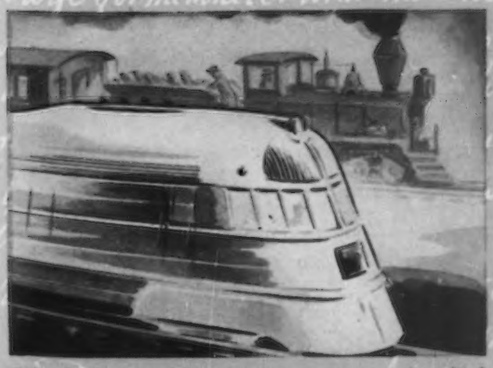
Isaac Pennock's father shook his head sadly. "Any man," he said, "who would leave a good farm, with wheat selling for $1 a bushel and go into the hazardous business of iron-making needs a caretaker." The other members of the family council nodded solemnly. Were not troublous times ahead? Why risk all in a rolling mill?

But Isaac Pennock was not deterred by the doubts, the forebodings of his family group around the table in the severely furnished Pennsylvania farmhouse. On July 2, 1810, Pennock and his equally venturesome partner, Jesse Kersey, obtained the quaintly worded deed reproduced on the background of these pages and acquired a tract of land on the Brandywine Creek at Coatesville. With farmer labor, the pioneering Pennock and Kersey constructed their buildings, installed their primitive mill and its prime mover, an overshot water wheel. Proudly they surveyed their new venture of 125 years ago . . . forerunner of the Lukens Steel Company of today.

The old, water-driven rolling mill of a century or more ago was limited in production to plates of less than 34" in width.

STEP BY STEP . . . THE DEVELOPMENT OF PLATE . . . THE GROWTH OF LUKENS STEEL

From the primitive plant of 1810, the growth of Lukens to its present recognition as the world's largest plate mill is an interesting, even fascinating story. For the history of Lukens is the history of iron and steel. In practically every development in iron and steel plate, Lukens pioneered. At many milestones of the industry, history shows, Lukens anticipated developments with the installation of equipment that proved far ahead of its time.

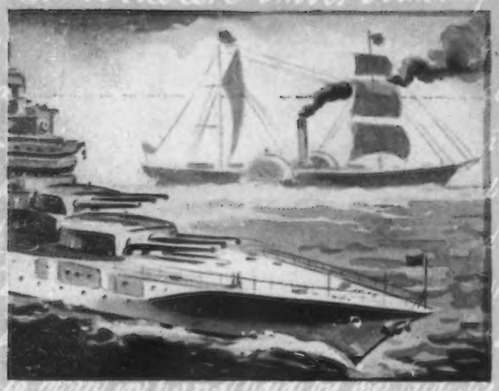


Like the first wood-burning locomotives, modern high speed streamlined trains, and present-day streamlined locomotives, use Lukens plates in their construction.

WOOD-BURNING LOCOMOTIVES STREAMLINED TRAINS

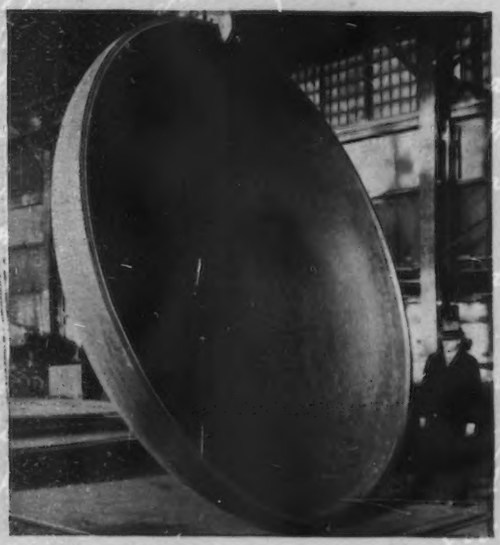
In the little mill on the Brandywine shortly after the war of 1812, Dr. Charles Lukens, Isaac Pennock's son-in-law, rolled the first boiler plate made in America. From his mill came boiler plate for the early wood-burning locomotives which terrified the countryside as they puffed along at astounding speeds of 10 and 15 miles an hour. From the modern rolling mills of Lukens came the Cromansil steel plates which Lukenweld, Inc., fabricated into the underframes of the sleek Zephyrs and the trim Flying Yankee. And streaking across three states at speeds over 100 miles an hour today are streamlined steam locomotives like the Lord and Lady Baltimore with Lukens nickel alloy steel in their 350 lb. boilers and fireboxes, and the twin Hiawathas that make the 410 mile Chicago-St. Paul run in 6½ hours, with Lukens silico-manganese steel in their 300 lb. boilers and fireboxes.

This Indenture



The early steamboats, which carried sails as a precaution, used Lukens plates. Today, a century and more later, modern greyhounds of the seas likewise have Lukens plate in boilers, auxiliaries and hulls.

A typical example of the large plates produced by Lukens through rolling on its 206" mill and flame-cutting. Lukens rolls plates up to 198" wide, up to 25" thick.



Largest elliptical head ever made, produced by Lukens. It is 13'0" in diameter, 2⅛" thick, and weighs 23,460 lbs.

FOR STEAMSHIPS THAT CARRIED SAILS . . TODAY, BETTER STEEL FOR THE BATTLE WAGONS

As in early railroad equipment, Lukens Plate, first in the boilers and later in the hulls, played an important part in the development of early steamboats. And in 1934, when Uncle Sam selected a new high tensile steel for his fighting craft, Lukens again furnished pioneer plate of manganese-vanadium steel. In the long trek between the side-wheel steamers and ocean greyhounds, Lukens sponsored many marine plate developments, not the least of which were the one-piece, wide plates which Lukens flanged into the heads that made possible the larger sizes of Scotch marine boilers. Quite the latest Lukens development is a new type of bulkhead system for fluid storage, fabricated by its Lukenweld division from pressed steel plates—a bulkhead that saves about 26% in weight and provides many other improvements.

GROWING WITH INDUSTRY AND NATION . . . "WORLD'S LARGEST PLATE MILL"

On the little mill on the Brandywine, plates as wide as 34" were almost impossible to roll. "If you cannot roll them in one piece," says a hand-written order that came to Lukens in 1825, "trim them out of two, allowing for the lap in the middle." As iron was replaced by steel, as locomotives grew in size and power, as boilers developed, as pressure vessels came into use, there was a never-ending demand for wider plate, thicker plate.

Time after time, Lukens anticipated industry's needs with mills of greater capacity, capable of producing larger plates than had ever before been rolled. Not so many years ago, Lukens boldly decided to build a mill, then as now, the world's largest plate mill. Some there were who scoffed at such a large mill, refusing to cooperate in designing and building such a visionary, impractical unit. But again Lukens went ahead, built a mill capable of rolling from 90,000 lb. ingots, with maximum finished plate weight of 50,000 lbs., widths up to 198", thicknesses up to 25".

Today, without the facilities of this "visionary, impractical" mill, one-piece locomotive crown and side sheets would be impossible, some of the most modern oil stills could not have been constructed in their present sizes, pressure vessel design would be years behind its present advancements—many other industrial equipment developments would not have taken place.

FLANGING AND FLAME-CUTTING . . WITH NEW WORK FOR LUKENS PLATE

With the installation of a mill producing wider and thicker plate than had ever before been obtainable, there was a decided impetus in the development of steel plate and its widening industrial application. Progress in machine-flanging, which Lukens pioneered a half-century ago, made possible many new uses of steel plate. (And it is interesting to note that Lukens has maintained its leadership in flanging and forming of steel plate, recently producing the largest one-piece elliptical heads ever made, 13'0" in diameter, 2⅛" thick, weighing 23,460 lbs. each.) Flame-cutting opened up still greater possibilities for steel plate, and today, wide and thick plates rolled on the Lukens 206" mill are being flame-cut into massive flywheels, column bases up to 25" thick for buildings, bridges and machinery, and for a wide variety

of parts for machinery and equipment which are providing product improvements and economies in costs for many manufacturers.

WELDING . . . AND WHAT IT MEANT

Rapid developments in the art of welding brought new and greater possibilities for steel plate, and many problems to the steel maker. In the developments of steels particularly adapted to welding, Lukens metallurgical and research engineers played as prominent a part as did the old Lukens pioneers in the days when industry first sought better iron of known physical properties, and later, changed over from iron to the new material, steel. No longer did Lukens sell merely plate. Not "How many tons?" but "What are you going to use it for?" became the important question. Cooperating with engineers, designers, fabricators and users of plate equipment, Lukens eagerly grappled with the metallurgical and mechanical problems engendered by the new art of welding. Soon, industry was availing itself of the special grades of alloy steels and welding quality plates rolled by Lukens, and the dual economies of fabrication by welding from the wider Lukens plates.

BUILDING BETTER STRUCTURES WITH LUKENWELD CONSTRUCTION

The development of the welding method of fabrication brought a new freedom to machinery and equipment design. Rolled steel plates and slabs, sound and clean, with known characteristics, could be flame-cut to size and shape, press-formed as necessary, and welded into a finished structure of greater strength, higher rigidity, less weight and ultimately lower cost.

Realizing that the problem was primarily an engineering one, and that much research and development work, in both engineering design and fabrication, must be done before industry could derive the great potential benefits of welded construction, Lukens established a division, Lukenweld, Inc. In the brief five years of its existence, Lukenweld has designed and built thousands of units of welded steel construction. Today, it is generally recognized as the pioneer and authority in the design and fabrication of welded steel structures for machinery and equipment.

CUTTING INDUSTRY'S COSTS . . . WITH LUKENS NICKEL-CLAD STEEL

Among the many innovations and developments which have come from Lukens in the past 125 years, none is more interesting than Nickel-Clad steel. Overcoming many metallurgical and mechanical difficulties, Lukens finally perfected a method of rolling pure Nickel and ordinary steel plate, thus producing a bi-metal with a light layer or cladding of pure, solid Nickel and the other and thicker layer of steel plate. This corrosion-resistant clad metal has permitted the construction of heavy equipment for the chemical, textile, soap and other industries at approximately one-third the cost of the same units in solid, corrosion-resistant metals. With new applications of Nickel-Clad developing almost daily, progress still continues. The near future will undoubtedly bring interesting announcements concerning further Lukens developments in clad metals.

ELIMINATING ECONOMIC WASTE . . . SEMI-FABRICATING FOR THE FABRICATOR

In its program for the development of steel plate, Lukens early realized the economic waste, the unnecessary freight cost, the scrap loss involved when plates were shipped to users for blanking, pressing, shearing and certain other operations. To take a simple illustration, in cutting a

Machine part, produced by Lukens, flame-cut from a plate 15" thick.

Typical of the work of Lukenweld, Inc., is this welded steel press bed, weighing nearly 25 tons.

Another example of the work of Lukenweld, Inc.— a welded steel shear frame, with a throat depth of 11'4".

Mixer of Lukens Nickel-Clad Steel for service in the rubber industry. It has a mild steel jacket, and is equipped with a Monel Metal agitator.

Ready for shipping in the plant of By-Products Steel Corporation—pressed heads, circle-cut and punched plates, and other shape-cut plates.

A wide variety of sizes and gauges are included in this group of shipments, photographed in the plant of By-Products Steel Corporation.

Pressed heads—typical of the wide variety of pressing work produced at By-Products Steel Corporation.

circle from a rectangular plate there is a scrap loss of about 25%. In making other parts, the scrap may well run to 75% of total plate weight. To eliminate this waste in industry, Lukens in 1927 organized a division, By-Products Steel Corporation, which supplies fabricators and equipment makers with a wide variety of plate shapes produced by flame-cutting, pressing, forming, die blanking or shearing, in 12-gauge and heavier. The By-Products plant is equipped with modern, cost-saving equipment, including the world's largest press brake, which can produce channels and many other forms of bends in sizes far in excess of those heretofore obtainable.

IN CLOSING . . . A WORD OF APPRECIATION

Today, tomorrow, and in the years to come, Lukens will go forward just as it has during the past 125 years. It will go forward with a keen realization that the most important factor in any success it has attained or may achieve is the good will and loyal support of its customers. All that human energy can do, all that modern facilities can accomplish, are pledged to the end that the man who writes "Lukens," "By-Products" or "Lukenweld" on a specification or order will receive a conscientiously made product, sold in an honest and friendly way, with an assurance of far more than usual service and satisfaction from his purchase.

Behind the name "Lukens" is an organization of over 2,000 men and women. 225 of them, about 10% of the entire personnel, have served Lukens continuously for 25 years or more. This group alone represents a total of 7,551 years of steel-making experience at Lukens. They are symbolic of all Lukens men and women, who, through their loyal, faithful service down through the years, have built Lukens, played the most important part in maintaining the Lukens reputation for quality of product. To all Lukens men and women, whether in Coatesville or in its branches and agencies that dot the States and Canada, a sincere salute. What Lukens is today after 125 years of growth, it is because of you.

And an intimate part of every company and an important factor in the success of any organization is the legion of those who, for want of a more appropriate word, are frequently referred to as "suppliers"—the companies who help us solve problems, who aid us in the design and construction of equipment that enables us to produce better products, who supply us with materials for the manufacture of our products. To those who, through their own engineering, research and development work, have done so much for us as well as for the entire steel industry, we make this acknowledgment of our gratitude. To serve better, to cope with the problems, the trials and the difficulties that may lie ahead, we ask no more than the continued help of those who have aided us so much in the past.

LUKENS STEEL COMPANY

Divisions:
BY-PRODUCTS STEEL CORPORATION
LUKENWELD, INC.
Coatesville, Pennsylvania

BRANCH OFFICES

New Broad Street Station Building
Philadelphia, Pa.
Chrysler Bldg., 405 Lexington Ave.
New York, N. Y.
205 Heffernan Building
Syracuse, N. Y.
Board of Trade Bldg., 131 State St.
Boston, Mass.
Mercantile Trust Building
Baltimore, Md.
1005 Citizens & So. Natl. Bank Bldg.
Atlanta, Ga.
427 New Center Building
Detroit, Mich.

SELLING AGENCIES

J. F. Corlett & Co.
Cleveland, Ohio....1201 Citizens Bldg.
Cincinnati, Ohio, 1132 Union Trust Bldg.
A. M. Castle & Co.
Chicago, Ill., 1500-1600 N. Branch St.
San Francisco, Cal., 20th & Indiana Sts.
Los Angeles, Cal., 2200 E. 55th Street
Seattle, Wash., 32 West Connecticut St.
C. E. Naylor
Houston, Texas.....1400 Conti St.
Dravo-Doyle Co.
Pittsburgh, Pa.....300 Penn Ave.
Eyler-Greenawalt & Co.
El Paso, Texas, 451 First Natl. Bank Bldg.
Barrett Steel Sales Co.
(for By-Products Steel Corp. only)
Indianapolis, Ind., 3667 Birchwood Ave.

CANADIAN DISTRIBUTORS

Drummond, McCall & Co.
Montreal, Que.....Toronto, Ontario

EXPORT AGENTS

International Railway Supply Co.
New York, N. Y.....30 Church St.

LUKENWELD, INC. AGENTS

W. R. McDonough & Co.
Cleveland, Ohio.....Natl. Bldg.
Mechanical Process Corp.
So. Orange, N. J.....8 Vose Ave.
Chas. A. Stone
Minneapolis, Minn....201 Sexton Bldg.

J. F. COBURN, *of J. F. Corlett & Co., Cleveland, Ohio, Lukens Sales Agent since 1890—45 years of service to Lukens.*

W. H. EDGERLY, *Manager of Sales, Lukens Steel Company, New York, N. Y. Joined Lukens in 1891—44 years of service to Lukens.*

J. F. CORLETT, *of J. F. Corlett & Co., Cleveland, Ohio, Lukens Sales Agent since 1890—45 years of service to Lukens.*

H. G. PORCH, *Manager of Sales, Lukens Steel Company, Boston, Mass. Associated with Lukens since 1895—40 years of service to Lukens.*

Every man pictured here, either a member of the Lukens sales department or a Lukens sales agent, has been associated with Lukens continuously for 30 years or more. All are typical of the entire Lukens sales organization—loyal always to Lukens and its interests, yet ever serving Lukens customers with equal fealty. Lukens welcomes this opportunity to recognize their consistent contributions to its welfare—contributions that are common to all who represent Lukens Steel Company wherever steel is used.

A. C. CASTLE, *President, A. M. Castle & Co., Chicago, Ill., Lukens Sales Agent since 1897—38 years of service to Lukens.*

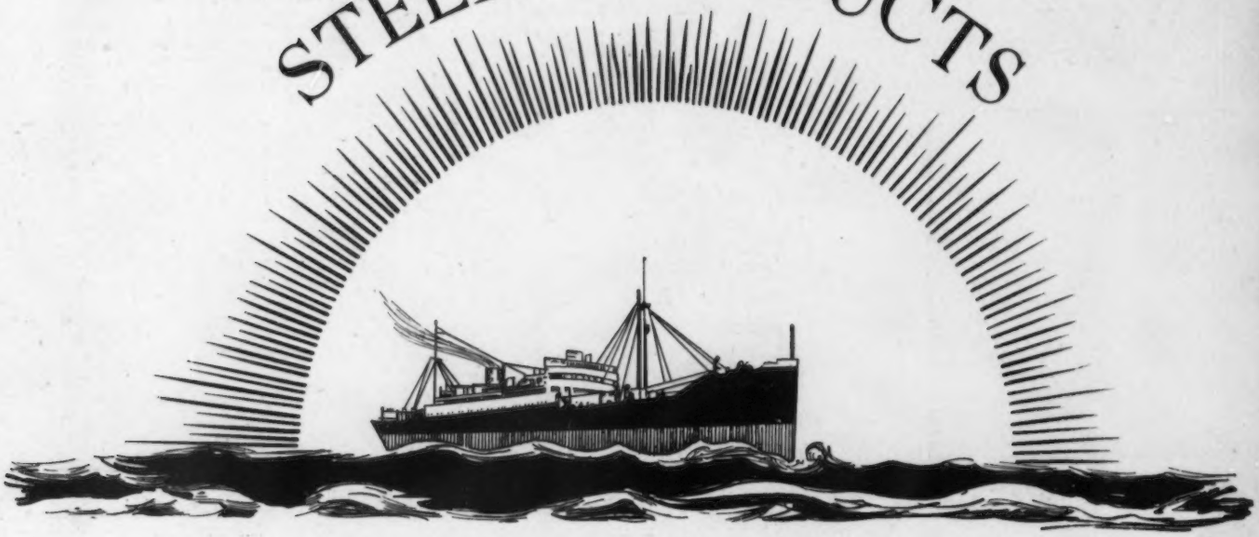
W. H. CRAMPTON, *Manager of Sales, Lukens Steel Company, Baltimore, Md. Joined Lukens in 1900 — 35 years of service to Lukens.*

W. B. SIMPSON, *Chairman of Board, A. M. Castle & Co., Chicago, Ill., Lukens Sales Agent since 1897—38 years of service to Lukens.*

C. M. BEAN, *Assistant to Manager of Sales, Lukens Steel Company, Boston, Mass. Joined Lukens in 1900—35 years of service to Lukens.*

HARRY LOEB, *Manager of Sales, Lukens Steel Company, New York, N. Y. Joined Lukens in 1905—30 years of service to Lukens.*

SHIPBUILDERS & FABRICATORS OF STEEL PRODUCTS



FABRICATED STEEL PRODUCTS

Class I Welded Pressure Vessels
Pressure Tanks—Welded or Riveted
Special Equipment
Fabricated Plate Work
Special Machinery

SHIPBUILDING ENGINE BUILDING

Passenger and Cargo Ships
Oil Tankers
Diesel Engines
Dry Docking
Engine & Machinery Repairs

We join the many friends of Lukens Steel Company in an expression of high esteem and congratulations as a tribute to our neighbor on their 125th anniversary and wish for them many more years of long continued service.

SUN SHIPBUILDING & DRYDOCK CO.
CHESTER, PA.

Electrification accelerates.. STEEL MILL PROGRESS

● In the displacement of the water wheel by the steam engine and later by the more flexible electric drive, the steel industry has kept pace with similar power progress throughout industry. Electrification is reducing production costs and increasing production speeds.

In this great development of electrified power, National Pyramid Brushes have played an all-important part. On generating equipment they have aided in maintaining a dependable source of electric power. On motors their sturdy characteristics have met the most exacting demands of industrial service. The uniformity and sturdiness of National Pyramid Brushes assure smooth, silent, reliable performance. The years of complete satisfaction experienced by Lukens Steel Company with National Grade 255 brushes on generating equipment typify the outstanding performance which has established National Pyramid Brushes in their position of leadership.

Through constant research and steady improvement in manufacturing methods, National Carbon Company has kept progress in brush manufacture abreast of that in the design and application of electrical equipment to industrial loads. The recent development of the "SA" Series of electro-graphitic brushes for heavy duty D.C. service marks another advance achieved by National Carbon pioneering in this field. National Carbon research and service organizations will gladly assist you in meeting your brush requirements.

PRODUCTS OF A UNIT OF UCC UNION CARBIDE AND CARBON CORPORATION

NATIONAL CARBON COMPANY, INC.
Carbon Sales Division, Cleveland, Ohio
Unit of Union Carbide and Carbon Corporation

UCC

Branch Sales Offices: New York · Pittsburgh · Chicago · San Francisco

THEN..

The pulsing lifeblood of the young steel industry was its men. Hours were long, and the work was hard. Mill hands measured their labor in sweat; production was counted in blood and muscle. Sledge and tongs stood for the old order in steel making.

Many operations were done by hand, a matter of sheer manpower. Sizes all down the line were severely limited by mechanical methods. Costs ran high. Fabrication to special order was an expensive task. Huge mills rose toward the sky to produce the necessary size and variety of shapes. Each became a specialist in one line, dependent on one kind of customer. Economically, such development was unsound.

In those days, oxy-acetylene cutting and welding were not known.

NOW..

Oxy-acetylene welding and cutting are vitally important to the steel industry. The oxy-acetylene process starts to work in preparing the charge and cutting up scrap. It aids in tapping, in pouring the metal, and preparation of ingots. Furnaces are tapped with the oxygen lance in a matter of seconds, replacing many minutes of sledging. Hot-tops are taken off the ingots by the cutting flame.

Previously, ingot size was rigidly controlled by the mechanical limitations of shearing. With the cutting blowpipe and lance, ingots may be any size, and the size of hot-tops can be regulated to yield better quality steel. Semi-finished steel products—blooms, slabs, billets—are conditioned and cut to desired size by the oxy-acetylene flame. Again the oxy-acetylene process steps in to speed up production. The ends of the finished shapes are trimmed to dimension by flame-cutting machines. This semi-automatic step assures speed, facility, flexibility of operations, with a low investment.

Oxy-acetylene welding and cutting still further aid production economy. The repair and maintenance of mill equipment are easily handled by this versatile tool. New and replacement parts are made, worn parts are rebuilt and resurfaced with hard metal. Labor and time are saved; continuous, economical operation is assured.

Oxy-acetylene welding and cutting have freed steel mill operations from the restrictions of standard shapes and limited market. Desired special shapes, even in three dimensions, are quickly cut out of standard stock by the oxy-acetylene flame and then welded together to form the finished product.

The oxy-acetylene process indeed has contributed much to the remarkable growth of the steel industry—and The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation, takes this opportunity to congratulate all who have cooperated in these achievements.

The oxygen lance has a wide field of use for tapping furnaces and ladles, cutting salamanders, spills, and ladle skulls. Here two lances are rapidly cutting a hot-top from a 24 by 66-inch alloy steel ingot in 15 minutes.

Cutting machines provide rapid, accurate, and economical means of shaping steel parts. In many cases the parts need no further finishing.

The oxy-acetylene process of cutting billets to size, is standard practice in many mills.

These three pictures show steps in the evolution of a crankcase for a 1,000 h. p. twin-six diesel engine, cut from stock plates and welded into an enduring, jointless unit. (LEFT) One of the flame-cut main frames. (CENTER) The crankcase partly finished. (RIGHT) The completed crankcase as it left the welding shop.

Everything for Oxy-Acetylene Welding and Cutting

LINDE OXYGEN • PRESTO-LITE ACETYLENE • OXWELD APPARATUS AND SUPPLIES

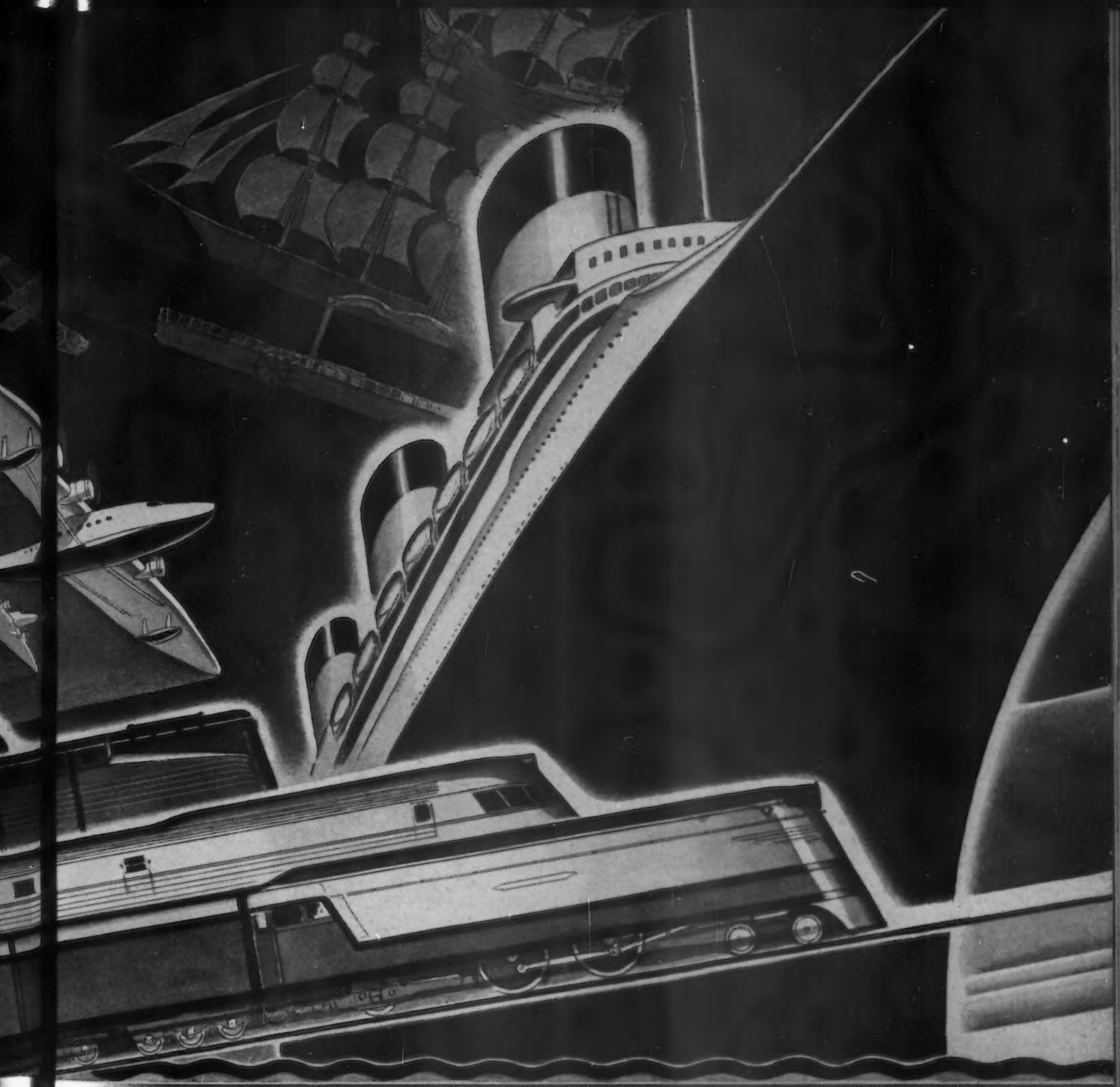
FROM UCC LINDE UNION CARBIDE

Alloy Steels

BLAZE THE TRAIL FOR MODERN PROGRESS

THE phenomenal development of transportation since the advent of alloy steels is typical of similar advances throughout industry. Without alloy steels the amazing speed of present day transportation equipment . . . or parallel performance and stamina in the equipment and products of all industry . . . could not have been attained with safety. High strength, toughness, shock resistance, heat resistance, corrosion resistance, light weight — all these have been made possible through the use of alloy steels.

For the production of alloy steels, the correct use of the right ferro-alloys is of utmost importance. Electromet Ferro-Alloys are uniform in composition, closely graded, correctly sized, and physically clean. An Electrome



service organization is maintained to demonstrate and teach the use of these alloys under the right conditions.

Electromet has pioneered in the field of ferro-alloys and alloy steels. The vast fund of practical and unbiased data thus developed, together with the further help of Electromet Engineers in selecting suitable materials for your needs, is available on request.

• Reprints of this pictorial panorama of the development of transportation are available for framing. You may have one without obligation by simply asking for it.

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation

CARBIDE and CARBON BUILDING
30 EAST 42nd STREET • NEW YORK, N. Y.

Electromet
Ferro-Alloys & Metals

LUKENS STEEL CO. MILLS

DESIGNED *and* BUILT *by*

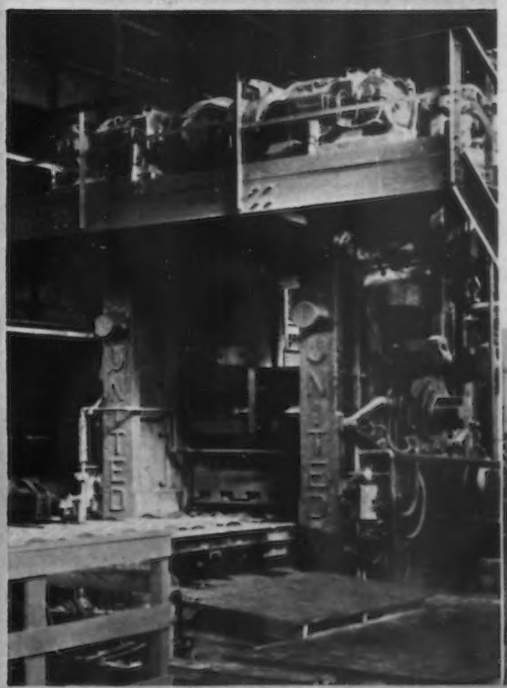
34" x 84" 2-High Roughing Plate Mill

UNITED

ENGINEERING *and* FOUNDRY COMPANY
PITTSBURGH — PENNSYLVANIA

Lukens Steel Company, a pioneer and leader in the Iron and Steel Industry, relies on equipment of established leadership for service in its plant.

For this company, UNITED, for many years the leader in the design and construction of the most modern and productive rolling mill machinery, has furnished; "The World's Largest Plate Mill" complete with Rolls, Tables, Etc. . . . 84" 2-Stand tandem Plate Mill . . . Rotary Side Trimming Shear . . . and various auxiliary equipment.



23" and 40" x 84" 4-High Finishing Plate Mill

Rotary Side Trimming Shear

SELENIUM

MAKES 18-8 STAINLESS

Easy to cut

IN AUTOMATIC SCREW MACHINES

"This Carpenter Stainless No. 8 cuts almost as well as our regular screw stock"

SAYS SUPERINTENDENT AFTER TEST

FREE-MACHINING properties given by adding selenium to Carpenter Stainless Steel No. 8 (18-8 chrome nickel steel) have won it many jobs where other stainless steels have failed!

Time after time Carpenter No. 8 has gone through production at speeds 70% to 80% of those used for regular screw stock. Free-Machining has made large savings on tool costs, has cut loss from rejects to a low figure.

Carpenter has pioneered in Stainless Steels by offering to industry the free-machining qualities. And so it leads in experience through following many of the newest applications of Stainless Steel today.

Call a Carpenter Representative to consult on the use of Free-Machining Stainless Steel in your product. With his knowledge of tough jobs recently licked by such free-machining qualities, he can probably help you apply it in places that were regarded as "too tough" or said to be "too expensive." Carpenter Representatives have done this many times before. They'll be more than glad to do it for you.

YOU'LL DO THE JOB EASIER WITH Carpenter STAINLESS STEEL

Carpenter STAINLESS

Almost gave up trying to use Stainless Steel

On these two shafts the manufacturer almost gave up trying to use Stainless Steel because of the difficult machining to close tolerances needed. Carpenter Stainless Steel No. 8 (18-8 chrome nickel steel with selenium) was tried and is now being used successfully.

This was a test— look what it proved!

This was forged from 9/16" hot rolled No. 8 Stainless Steel Rod. Trimmed hot and punched cold, both operations OK. Shank face ground OK. Milled ear (gang cutter used) OK—part heated slightly. Drilled shank at 83 ft./min.—squealed slightly. Drilled ears at 83 ft./min.—OK—little burr OK. Tapped shank at 240 R.P.M. or 20 ft./min. squealed—but good thread. Reamed ears OK—good finish.

This company had given up as impossible the use of 18-8 Stainless on wire rope end fittings for airplane and yacht work, jobs that needed corrosion resistance. The cost of machining was absolutely out of sight. Since this test they are going ahead with quotations, based on slightly reduced speeds because of the squealing.

Congratulations to

LUKENS STEEL COMPANY

on their

125*th* ANNIVERSARY

STEELS

SEND COUPON TODAY!

(This offer good only in U. S. A.)

The Carpenter Steel Co., 121 West Bern St., Reading, Pa.
Please send your free pocket-size Slide Chart on Stainless Steels immediately. Thank you.

NAME _____ TITLE _____

FIRM NAME _____

STREET and NUMBER _____

20,000-lb. LIFTS of LUKENS STEEL SHEETS

BUNDLED SECURELY ON SKIDS—— SHIPPED SAFELY AND ECONOMICALLY ——WITH ACME UNIT-LOAD BAND

● Sheet steel is only one of the many products that are safely and economically secured to skids or pallets by the Acme Unit-Load system.

Greater protection to the steel is provided because the tightly tensioned steel bands tie the "package" so securely that the stresses of traveling and handling can't cause movement or friction to mar the surface of the steel. Even cold rolled strip of the very finest surface can be tied, and safely shipped with Acme Unit-Load Band.

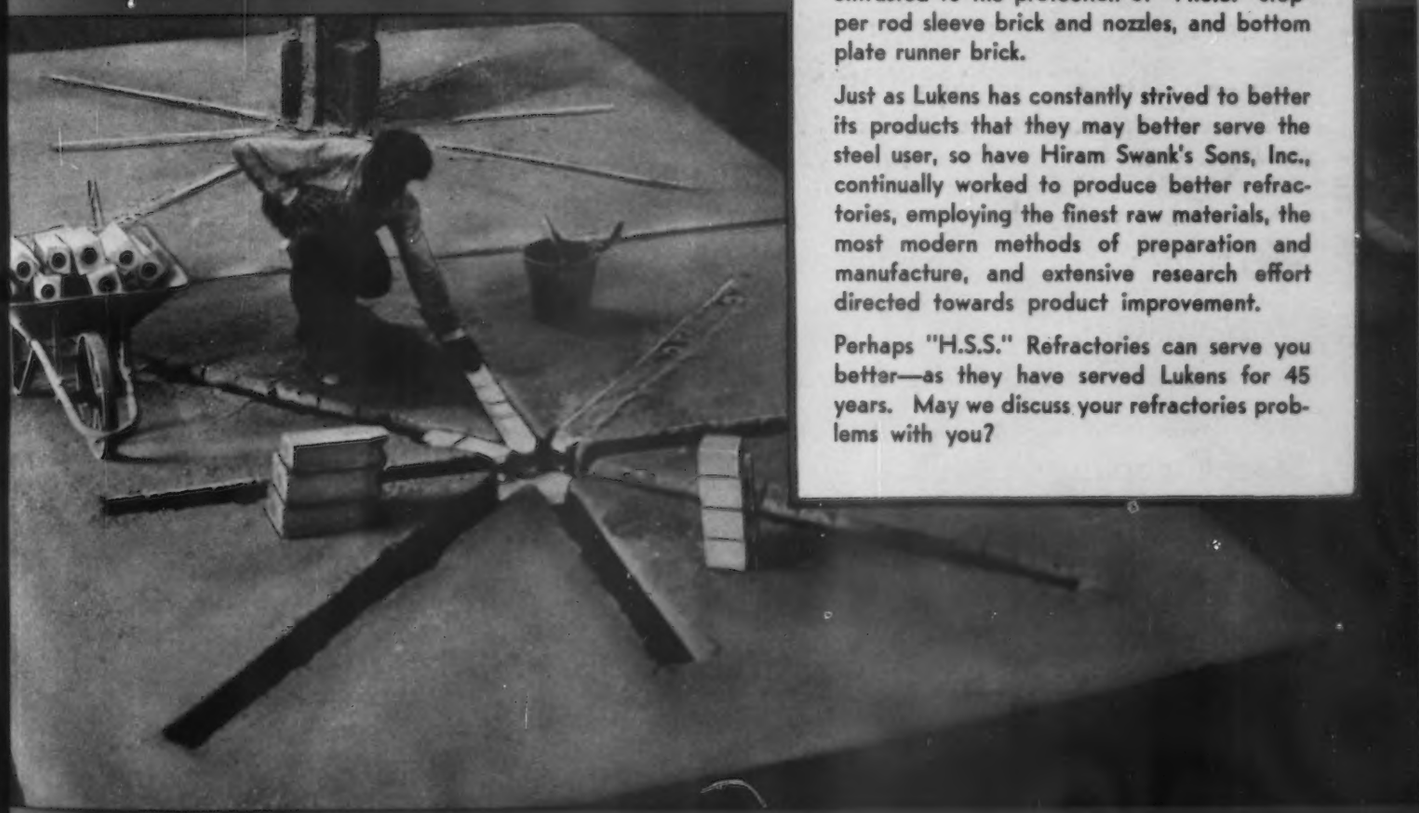
Write today for details of the Acme Unit-Load skid shipping method for steel. Let us work with you in developing a money-and-time-saving recommendation for your shipments.

ACME STEEL COMPANY

GENERAL OFFICES: 2825 ARCHER AVENUE, CHICAGO

Branches and Sales Offices in Principal Cities

REFRACTORIES
in the
"WORLD'S LARGEST PLATE MILL"



For 45 years, "H.S.S." Refractories have merited selection by Lukens Steel Company —progressive pioneer of the iron and steel industry through 125 years.

Thousands and thousands of tons of steel from the Lukens open hearths have been entrusted to the protection of "H.S.S." stopper rod sleeve brick and nozzles, and bottom plate runner brick.

Just as Lukens has constantly strived to better its products that they may better serve the steel user, so have Hiram Swank's Sons, Inc., continually worked to produce better refractories, employing the finest raw materials, the most modern methods of preparation and manufacture, and extensive research effort directed towards product improvement.

Perhaps "H.S.S." Refractories can serve you better—as they have served Lukens for 45 years. May we discuss your refractories problems with you?

HIRAM SWANK'S SONS, INC.

Established 1856

Producers of Fire Clay Refractories, including Center and Bottom Plate Runner Brick, Sleeves, Nozzles, Tuyeres, Ground Fire Clay, High Grade Fire Brick, Shapes, Ladle Brick, Radial Chimney Block and Hot Tops.

JOHNSTOWN, PA.

BRANCHES AT PITTSBURGH, ST. LOUIS, CHICAGO, CLEVELAND AND PHILADELPHIA

E. and G. BROOKE IRON CO.

Manufacturers of

Basic, Malleable, Foundry, Forge,
Bessemer and Low Phosphorus Pig Iron

BIRDSBORO, PENNA.

•

THE E. and G. Brooke Iron Co., incorporated in 1880, and its preceding firms of the same family ownership, have had business dealings with the Lukens Steel Company of Coatesville, Pa., almost from the time the Lukens Steel Company was started in 1810—125 years ago.

The satisfactory relationship which our Company and its predecessors have always had with our Coatesville neighbor is one of those old ties of business and family friendship and esteem which makes being in business at times really worth while.

Mr. Charles Huston, of Lukens Steel Company, and the firm of E. and G. Brooke were instrumental in the incorporation of the Wilmington & Northern Railroad in 1866, and in the building of this road shortly afterwards. The Railroad, running at first from Wilmington through Coatesville to Birdsboro, and later extending to Reading, was, of course, a great advantage to both concerns and brought them much closer together.

E. and G. Brooke in the earlier days used most of their Pig Iron in our own Rolling Mill, although we had an outside Foundry iron business. The first tonnage of Basic iron which we produced was sold to Lukens Steel Company in 1896.

It is our great pleasure to congratulate Lukens Steel Company on its long record of business success, and for the very high regard in which the Company and its products have been so universally held.

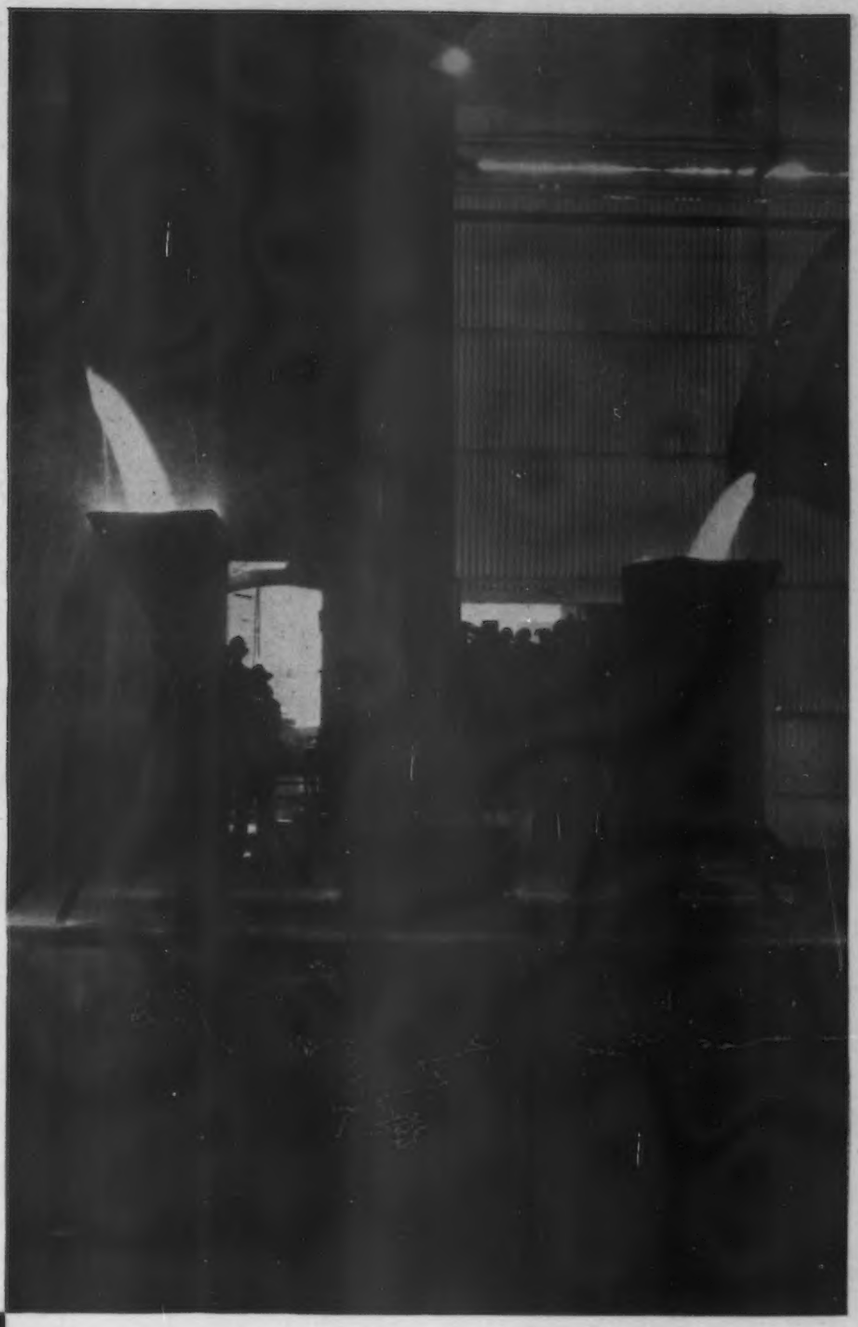
We are glad, indeed to join in its 125th Anniversary Celebration and to extend our heartiest best wishes for its long continued prosperity.

E. AND G. BROOKE IRON CO.,

Robert E. Brooke

President.

Pouring a Birdsboro Chilled Roll in the Birdsboro foundry. Birdsboro produces rolls for a wide variety of work, in carbon and alloy analyses.



FOR many of its 125 years, Lukens Steel Company has utilized the products of Birdsboro.

Serving today in the Lukens 84" Mill and Universal Mill are Birdsboro Steel and Chill Iron Rolls—both working rolls and backing up rolls—aiding Lukens daily in producing the high quality steel plates for which they have been so well-known down through the years.

Birdsboro Cast Steel Rolls installed on the 84" Mill at Lukens.

TO industries requiring carbon and alloy steel castings and rolls, rolling mill machinery, hydraulic equipment, special machinery, and equipment for rock crushing, ore handling or many other purposes, Birdsboro has a designing and manufacturing service that usually brings lower costs to the user. Consult Birdsboro on your next requirements.

BIRDSBORO
STEEL FOUNDRY AND MACHINE COMPANY
DESIGNERS AND BUILDERS
BIRDSBORO, PENNSYLVANIA

BLAW-KNOX

Blaw-Knox Company congratulates Lukens Steel Company on its 125th anniversary, a memorable period of years surrounding the growth of a mighty nation.

Blaw-Knox Company is now in its thirtieth year of design and manufacture of special machinery and equipment for steel plants. Long familiarity with operating technique and the employment of engineers who are themselves qualified operating men, has resulted in the development of the following products which are widely used in the steel industry:—

Products of Blaw-Knox Company and Subsidiaries

Rolls for Rolling Mills
Water Cooled Doors and Frames
Reversing Valves
Ports
Skewbacks
Buckstays
Preheaters
Dolomite Machines
Sloping Backwalls
Single Motor Door Hoists
Annealing Boxes
Clamshell Buckets
Steel Grating
Dust Collectors
Steel Buildings
Steam Purifiers
Gas Cleaners
Steel Castings
Alloy Castings
Mill Drives
Shape Straighteners
Motor Operated Screw Downs
Gear Sets
Bar & Billet Mills
Cold Mills
Rail Breakers
Rail Re-Rolling Mills
Universal Mill Spindles
Shears
Special Machinery, etc.

BLAW-KNOX COMPANY
PITTSBURGH, PA.

Subsidiaries

LEWIS FOUNDRY AND MACHINE COMPANY
NATIONAL ALLOY STEEL COMPANY
PITTSBURGH ROLLS CORPORATION
UNION STEEL CASTING COMPANY

POWER

FOR THE WORLD'S LARGEST PLATE MILL

A view of the 20,000 h.p. engine built by Mesta Machine Company, Pittsburgh, Pa. This engine is of the duplex, twin tandem, compound, reversing type, and is actually composed of two tandem compound engines, each with a 46" diameter high-pressure cylinder and a 70" low-pressure cylinder with a 60" stroke. These two engines are placed side by side and connected with a crank-shaft on which is mounted a large pinion. Through this shaft and pinion, the power from each is delivered to a large gear mounted on a shaft and connected to a lead spindle, or shaft, which transmits the concentrated power, through a set of pinions, to the mill.

Lukens Steel Company—"the first to make boiler plate in America"—proves quality the first ingredient in steel—and oil

For 125 years the successive managements of —"the first to make boiler plate in America"— have consistently made quality the first and most important ingredient of their products.

Lukens Steel Company has proved, by these many years of experience, that quality in lubricants is vital to efficient and economical steel mill operation.

Texaco tested Lubricants have demonstrated their unsurpassed quality, efficiency, stamina by keeping their 20,000 h.p. steam engine operating with entire satisfaction under all load demands and varying operating conditions.

THE TEXAS COMPANY

135 East 42nd Street • New York City

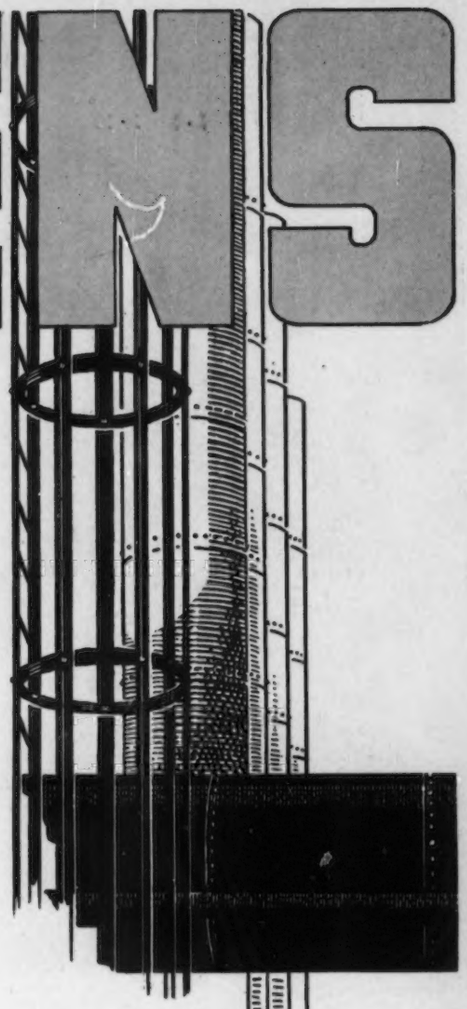
Nation-wide distribution facilities assure prompt delivery

TEXACO *tested* LUBRICANTS

REFINERY TESTED FOR UNIFORMITY • • • SERVICE TESTED FOR ECONOMY

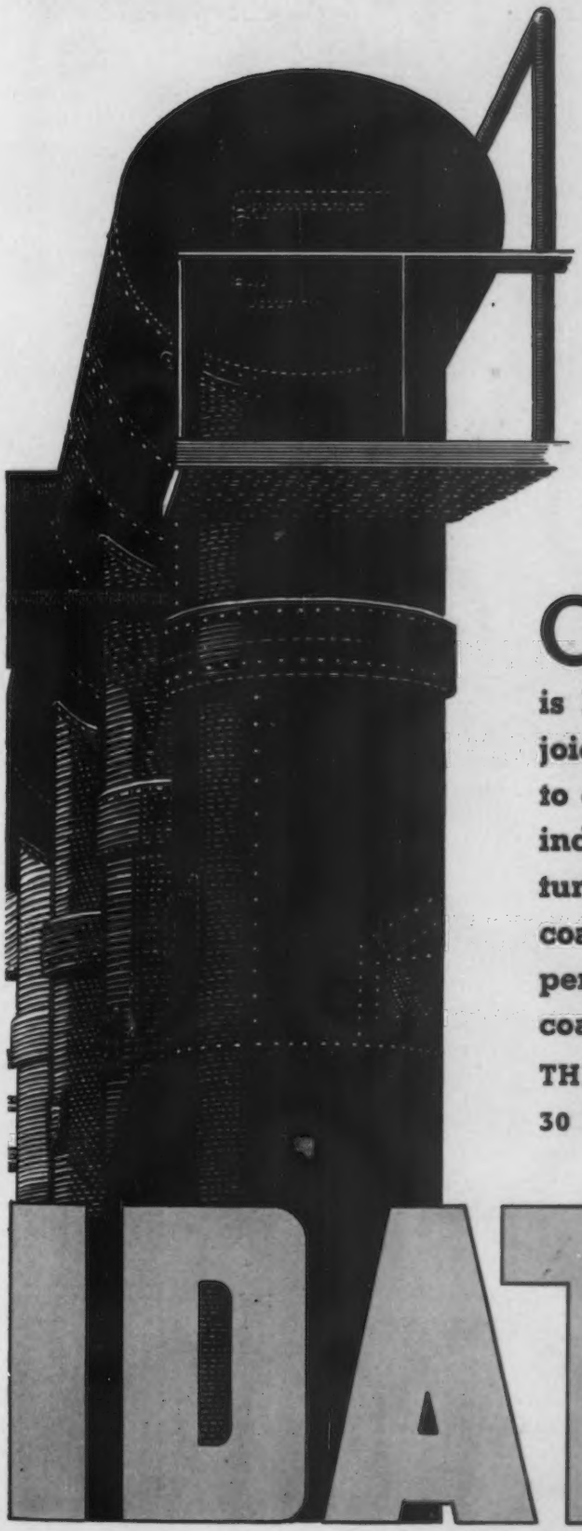
LUKENS

. . . . a name that for 125 years has been increasingly famous wherever steel is used, an unquestioned mark of honor, integrity, and enduring worth.



View of down comers between gas producers and 140" mill building, Lukens Steel Company.

CONSOL



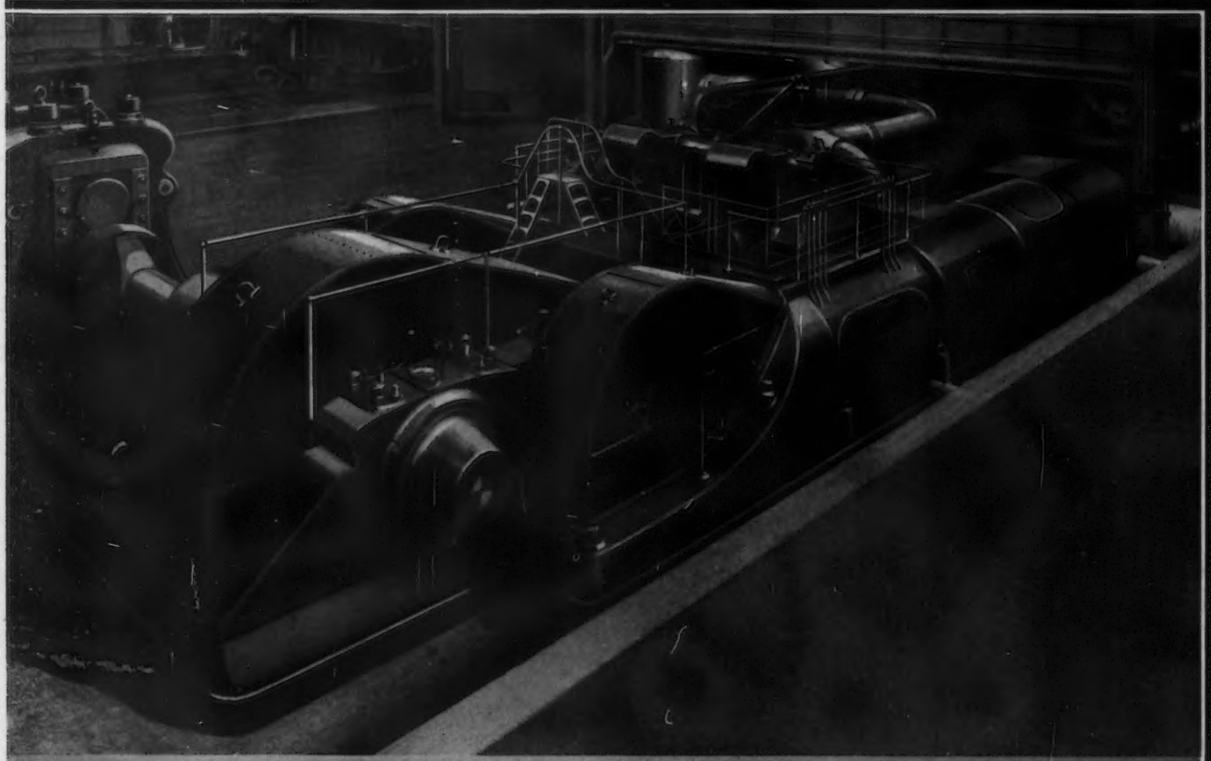
ON this memorable anniversary of Lukens Steel, The Consolidation Coal Company is happy to extend its felicitations, and rejoices that it has been able, in some measure to contribute to that success which the entire industry now lauds * * * For nearly half a century Consolidation has supplied Lukens with coal as uniform in characteristics, and as dependable in performance, as the steel that coal has helped to make.

THE CONSOLIDATION COAL COMPANY, INC.
30 ROCKEFELLER PLAZA • NEW YORK, N. Y.

IDATION

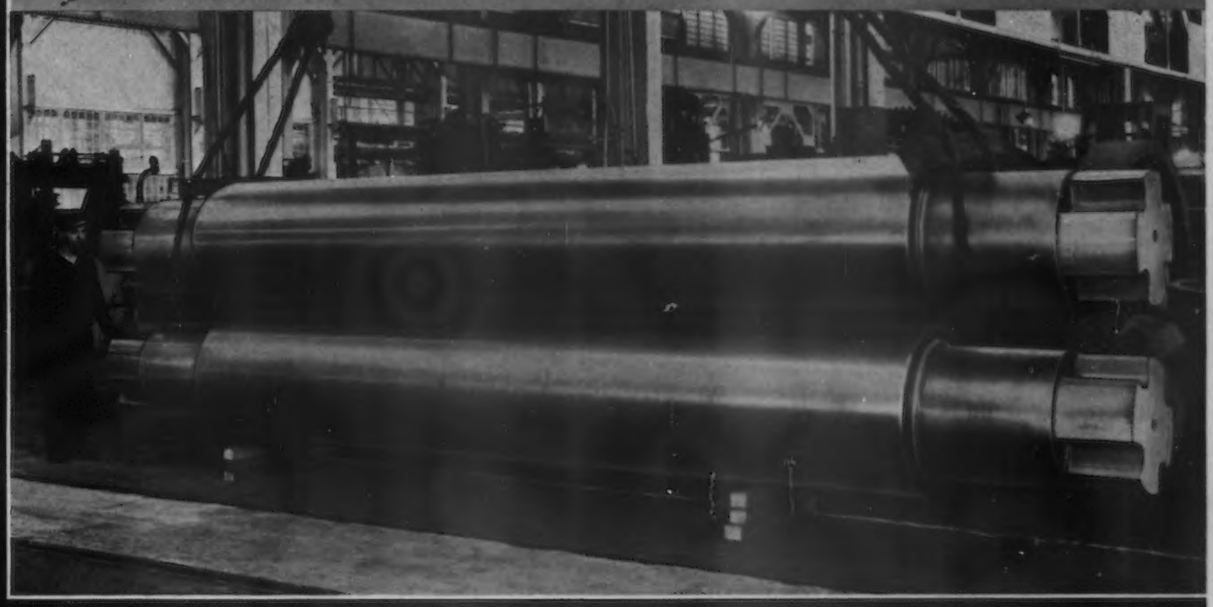
LUKENS STEEL COMPANY

125 YEARS



MESTA 46" & 70" x 60" Heavy Duty Twin Tandem Geared Reversing Engine Driving LUKENS 206" Plate Mill

MESTA Rolls for LUKENS 206" Plate Mill



# of PROGRESS

ROLLS and ROLLING MILL MACHINERY

Four High Continuous Hot Strip Mills

Four High Continuous Cold Strip Mills

Tension Reels Feed Reels Levellers Continuous Pickling Machines

Hot Strip Coilers Scrubbing Machines

Flying Shears Slitters and Trimmers Gear Drives Mill Pinions

MESTA MACHINE COMPANY

PITTSBURGH, PENNA.

TIME, that Tough Old Tester of men, materials, and organizations had watched the Lukens Steel Company grow to a vigorous youth when the Reading Iron Company's earliest unit began business nearly a hundred years ago.

Now that a century and a quarter have passed, it is a pleasure to congratulate the Lukens Steel Company on reaching its 125th birthday while preserving the same progressive policies, the same aggressive effort that marked that far away beginning.

It is a long journey from 1810, through years of war and peace, of panic and prosperity, to 1935. It is a great achievement to have survived and prospered throughout that period.

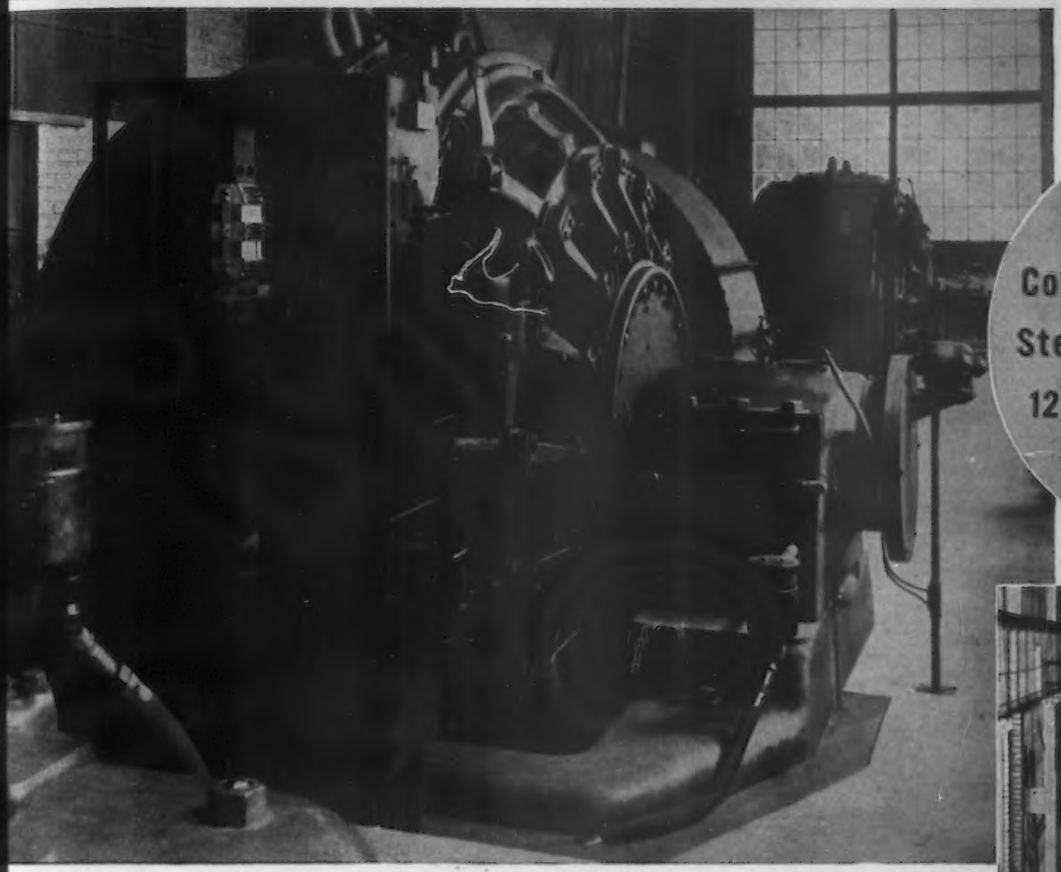
For almost a hundred of those years, the Reading Iron Company has enjoyed many commercial transactions with the Lukens Steel Company. Equipment made by the Reading Iron Company plays an important part in the operation of Lukens Mills. Many experiments leading to new developments in the use of Genuine Puddled Wrought Iron have been conducted jointly.

Specialists in their branch of the iron and steel industry, as the Reading Iron Company is in its field, we look forward to many more decades of the pleasant relations enjoyed in the past.

READING IRON COMPANY • PHILADELPHIA

Manufacturers of Genuine Puddled Wrought Iron Products

DEPENDABLE G-E DRIVES ON LUKENS TANDEM PLATE MILL



General Electric Congratulates Lukens Steel Company on Its 125 Years of Service to Industry

GENERAL ELECTRIC equipment drives the 84-inch tandem plate mill of the Lukens Steel Company. This mill is one of the most modern of its kind. G-E motors and control were selected for this important task because of their dependability, economical operation, and low maintenance cost. Efficient design, greater overload capacity, and better commutating characteristics all combine to keep the long-run operating cost of G-E steel-mill drives low and to afford steady and continuous production.

A-c. and d-c. motors and control, motor-generators, switchgear, cable, and protective devices, specially adapted to steel-mill operation, aid in maintaining uniformly low production cost per ton. Consult the steel-mill specialist in the nearest G-E office for information on electric equipment for your mill. General Electric Company, Schenectady, N. Y.

011-74

GENERAL ELECTRIC

The Officers

the Sales and Technical Staffs

of

Vanadium Corporation of America

are pleased indeed to participate

in the

One Hundred Twenty-fifth Anniversary

of

LUKENS STEEL COMPANY

•

The Vanadium Corporation

also wishes to record the pleasure experienced at all times

in its association with

LUKENS STEEL COMPANY

in the development of

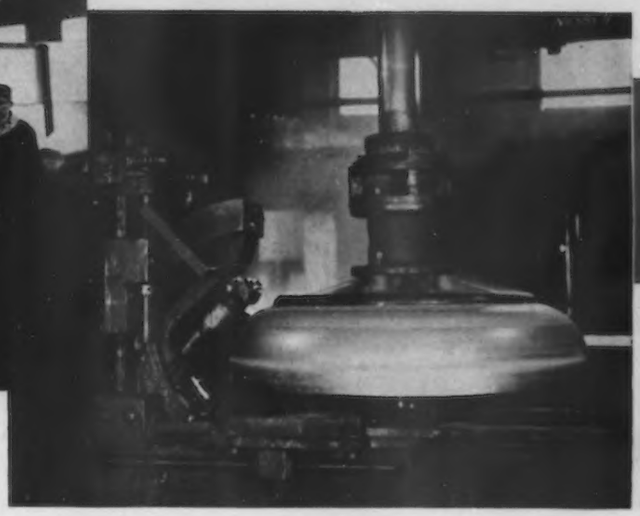
New and Improved Steel Products

Fabricating Heads of EVERDUR Metal

for large-size pressure vessels

in the world's largest plate mill

Flanged and dished head of Everdur Metal in the Lukens plant. This head measures 132 inches outside diameter and is ¾ inch thick.



Spinning an Everdur head in the Lukens plant. This flanging machine was designed to spin heads of all types from plates up to 198 inches in width. These can be rolled only on Lukens' 206 inch mill, the largest plate mill in the world.

LUKENS STEEL COMPANY supplies all kinds and sizes of spun and dished Everdur heads to tank and heater manufacturers for the fabrication of non-rust Everdur equipment for apartments, hotels, laundries, process plants, etc.

Everdur is a highly corrosion-resistant copper-silicon alloy which provides the strength of medium carbon steel. Since it is readily welded by all usual methods, Everdur is more and more regarded by engineers, fabricators and users as the *ideal* metal for many types of rustless tanks—ranging in capacities from 1 to 20,000 gallons. Everdur is supplied in all commercial shapes, including tank plates with physical properties comparable to those specified for steel boiler plate in the A. S. M. E. Code.

The constantly growing popularity of Everdur tanks finds leading fabricators furnishing this quality equipment in increasing volume. Many of these concerns "look to Lukens" for spun and dished tank heads.

In addition to high strength, excellent corrosion-resistance and ready weldability, Everdur possesses high fatigue limit, unusual ductility and good machining properties. It is worked either hot or cold, and may be cast, rolled, drawn, spun, stamped, pressed, forged and welded.

EVERDUR METAL

"EVERDUR" is a registered trade-mark, identifying products of The American Brass Company made from alloys of copper, silicon and other elements.

ANACONDA

from m[illegible]sumer

THE AMERICAN BRASS COMPANY

General Offices: Waterbury, Connecticut

Offices and Agencies in Principal Cities

EVERDUR METAL *for* TANKS

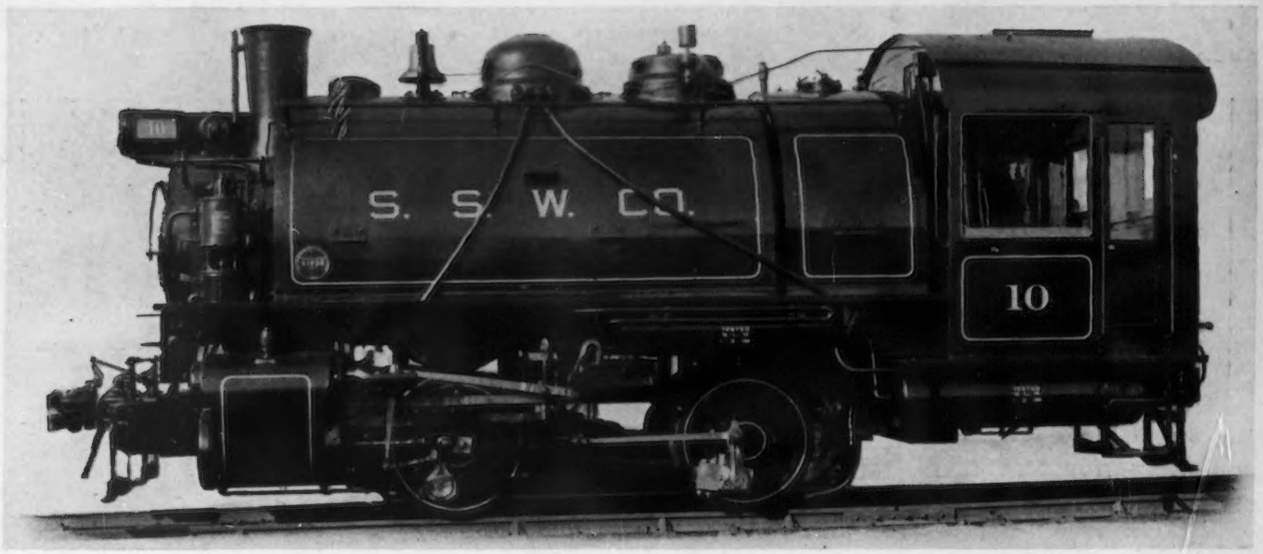
BALDWIN *Congratulates* LUKENS

104 YEARS OLD — 125 YEARS OLD

and offers to the steel industry an

AUTOMATIC OIL-FIRED STEAM LOCOMOTIVE

easily operated by one man



Fire automatically controlled by the steam pressure.

No steam wasted, and the thermal efficiency approximately doubled.

Oil tank protected by water jacket for open-hearth operation if desired.

With no ashes to dump, and adequate provision for fuel and water supply, we believe this new development of ours has as high availability as any internal combustion locomotive, at much lower capital investment.

Let us tell you more about this new type of switching power!

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, PA.

The World's Largest Plate Mill is EC&M Controlled...

THIS is the "Big Mill" at Lukens Steel Company, Coatesville, Pa., the like of which you can see nowhere else in this wide world. There has never been any mill comparable to it and yet, in spite of its size, it is extremely fast, accurate and dependable.

The unusually successful record of operation of this mill is a splendid tribute to EC&M Control Apparatus and EC&M Control Engineering... originally selected for the mill which has become world famous not only for its size but also for the quality of the finished product.

Correct guage of the finished plate is insured by EC&M fast-operating contactors which permit moving the screwdown motors only a fraction of a revolution when adjusting the rolls for the final pass.

Fast-working controllers, as designed by EC&M, are equally as important on traveling cranes, charging machines and other steel mill auxiliaries. Specify EC&M control for your motor requirements.

Other EC&M Products serving LUKENS...

TYPE SA LIFTING MAGNETS—economical tools for material handling.

AUTOMATIC-DISCHARGE MAGNET CONTROLLERS which cut down the time waiting for the magnet to release the load.

YOUNGSTOWN SAFETY LIMIT STOPS—without one, a crane is as risky as a boiler without a safety valve.

TIME-CURRENT CONTROL on their Universal Mill which has materially increased the speed and accuracy of this mill.

WRIGHT DYNAMIC LOWERING CRANE CONTROLLERS which permit more trips per minute with less power consumption.

TYPE WB BRAKES on Cranes which are designed to permit the greatest amount of wear—the longest life—before relining is necessary.

THE ELECTRIC CONTROLLER & MFG. CO.

Quick-responding—Fast-operating—Heavy Duty Motor Control
Accurately Engineered for Cranes, Mill Drives and Machinery

8700 E. 79th ST. CLEVELAND, OHIO

Should auld acquaintance be forgot,
And never brought to min'?
Should auld acquaintance be forgot,
And auld lang syne?
Robert Burns.

In April **1899** we shipped The Lukens Steel Company for the first time and have supplied them continuously up to the present time. Our first product was **RAW DOLOMITE.**

In **1902** we developed a Single Burned Dolomite, known to the trade as **BAKER'S DOLOMITE** and The Lukens Steel Company immediately became a customer for the improved product.

In **1910** we again pioneered and placed on the market **MAGDOLITE,** a specially prepared dead burned dolomite and the only substitute for Magnesite at that time. The Lukens Steel Company was among the first to recognize its merits and today depends on **MAGDOLITE** for low refractory costs and increased furnace efficiency.

In **1935** we are glad to join in a tribute to The Lukens Steel Company for their honorable record in the development of the Steel Industry and the United States of America.

J. E. BAKER COMPANY
YORK, PA.

●

Low Silica Limestone · ***Chemical Lime*** · ***Fluxing Lime***

Serving the
STEEL INDUSTRY . . .
Norton Abrasives

LUKENS meets the world's demand for steel products — newer and better steels. Norton meets the abrasive requirements of the steel industry — developing new and better wheels to grind the harder steels, the gigantic rolls of the rolling mill, to sharpen the huge shears that cut and shape the steel, wheels to smooth billets and castings.

We congratulate Lukens on a century and a quarter of success.

We boast of our own half century—of our own achievements in the abrasive industry and the position Norton Abrasives, Norton Grinding Wheels, now hold in the world of metals.

NORTON COMPANY, WORCESTER, MASS.
New York Chicago Detroit Philadelphia Pittsburgh
Hartford Cleveland Hamilton, Ont. London Paris
Wesseling, Germany

W-512

★

Higher Wages But Lower Costs

—The Result of BEDAUX Analysis

Engineering analysis by Bedaux of all manufacturing operations at the Lukens plants has made possible the establishment of fair rates of compensation for Lukens employees.

Employees are better paid than formerly while the company obtains a fair day's work for the higher compensation.

For 20 years, Bedaux has served management.

Nine hundred and twenty-two of the outstanding concerns of the world use Bedaux as means of control.

It is proud to include Lukens Steel Company among its clients.

THE CHAS. E. BEDAUX COMPANY
OF NEW YORK, INCORPORATED

D. S. KEOGH
PRESIDENT

22 East 40th Street
New York, N. Y.

IN THE

LUKENS

STEEL MILL

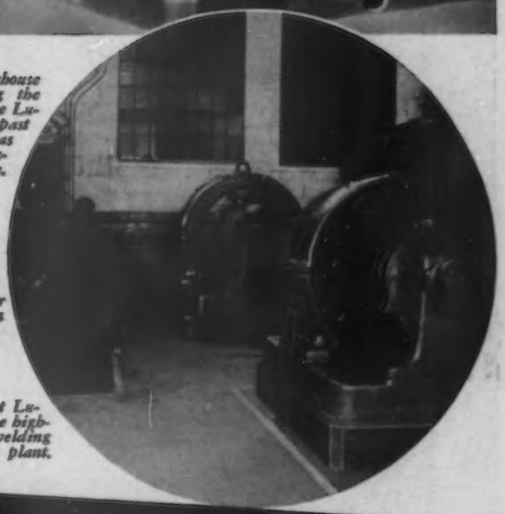
W WESTINGHOUSE ELECTRIC

Since 1898, Westinghouse Electric has served this pioneer Steel Company.

19,495 HP.

of Westinghouse Motors

This 3750-hp. Westinghouse motor has been driving the 112 in. plate mill in the Lukens Steel Plant for the past ten years. Its operation has been characterized by extremely low maintenance.



Installed in 1916, these two Westinghouse rotary converters, rated at 500 and 1000 kv., have been in continuous service for 19 years in the Lukens Open Hearth Substation.

Electric arc welding at Lukenweld, Inc. One of the high-capacity Westinghouse welding machines used in this plant.

Throughout its 125 years, Lukens Steel Company has fostered progressive ideas.

In 1898, courage and foresight were required to substitute untried electric power for mechanical power, yet Lukens installed a Wellman and Seaver Charging Machine driven by Westinghouse Motors.

Since those early days, Westinghouse generators, rotary converters, motor-generators, auxiliary motors, main roll motors and other related electrical equipment have been installed in this mill. Today, 788 Westinghouse motors of all kinds are in service making a total of nearly 20,000 horsepower.

R-89031

Westinghouse . . .

THE WORLD'S LARGEST PLATE MILL
Is Equipped With
TRABON AUTOMATIC LUBRICATION

Lukens Steel Now Has 30 Trabon Centralized Systems Lubricating Over 1000 Vital Points

Manufactured By

TRABON ENGINEERING CORPORATION

1814 EAST 40TH STREET, CLEVELAND, OHIO

Offices In Principal Industrial Centers

TRABON PROVIDES SIMPLE AND POSITIVE LUBRICATION

HEARTIEST CONGRATULATIONS

AND BEST WISHES—LUKENS STEEL—

ON THIS, YOUR 125TH ANNIVERSARY

JOHN A. ROEBLING'S SONS CO.

TRENTON, NEW JERSEY

● Roebling Steel Wire Rope and Wire Rope Slings are used by Lukens Steel Co. throughout their plant for all hoisting purposes.

LATROBE ELECTRIC STEEL COMPANY

LESCO

LATROBE, PENNA.

Manufacturers of Steels of
Most Exacting Requirements

HIGH SPEED TOOL STEELS
SPECIAL ALLOY DIE STEELS
OIL HARDENING NON-DEFORMING DIE STEELS
CHROME VANADIUM TOOL STEELS
CARBON TOOL STEELS
COBALT AND TUNGSTEN MAGNET STEELS
STAINLESS STEELS

General Offices and Works: LATROBE, PA.
General Sales Office: 40 West 40th Street, NEW YORK, N. Y.
Branch Offices in all Principal Cities

We Congratulate Lukens Steel Company On Their 125th Business Birthday

LATROBE ELECTRIC STEEL COMPANY

LESCO

LATROBE, PENNA.

LUKENS—America's Oldest Steel Company

Uses SINCLAIR OIL

Tandem Compound Condensing Engine driving 48" three-high Universal Mill of the Lukens Steel Company, Coatesville, Pa.

STEAM cylinder lubrication is one of the major factors in keeping prime movers of steel mills in continuous operation at minimum upkeep cost.

In accomplishing this the valve oil used must safeguard against high super-heat and bad water conditions. It is a matter of pride with Sinclair that Lukens Steel Company, famous for 125 years, uses Sinclair Valve Oil Dark, throughout.

MODERN stepping-up of mechanical efficiency frequently introduces lubricating requirements of unfamiliar and more exacting character. Sinclair Engineers apply to the solution of these new problems their knowledge of the "work-factor" of lubricants determined accurately through the use of Sinclair's Navy Work-Factor Testing Machines shown above.

At its East Chicago Laboratories, Sinclair has the largest commercial installation of these machines in the United States.

"Work-Factor News," illustrating important and interesting solutions of lubricating problems is sent free to those interested. Address Sinclair Refining Company (Inc.), 45 Nassau St., New York.

A CENTURY AND A QUARTER

ONE hundred twenty-five years is a long period, measured by a man's life, measured by the world's progress. To achieve it a business must of necessity have offered a product and a service which was respected, which was sought after. In addition, they must have successfully adapted themselves to meet the most terrifically changing conditions this world has ever known.

Lukens Steel Company are completing their 125th year. The Midvale Company are genuinely glad of the opportunity to congratulate a fellow-member of the steel industry on so long and honorable a record, and wish them equal respect and success in the years to come.

THE MIDVALE COMPANY · · NICETOWN, PHILADELPHIA

OFFICES: *New York · Chicago · Pittsburgh · Washington · Cleveland · San Francisco*

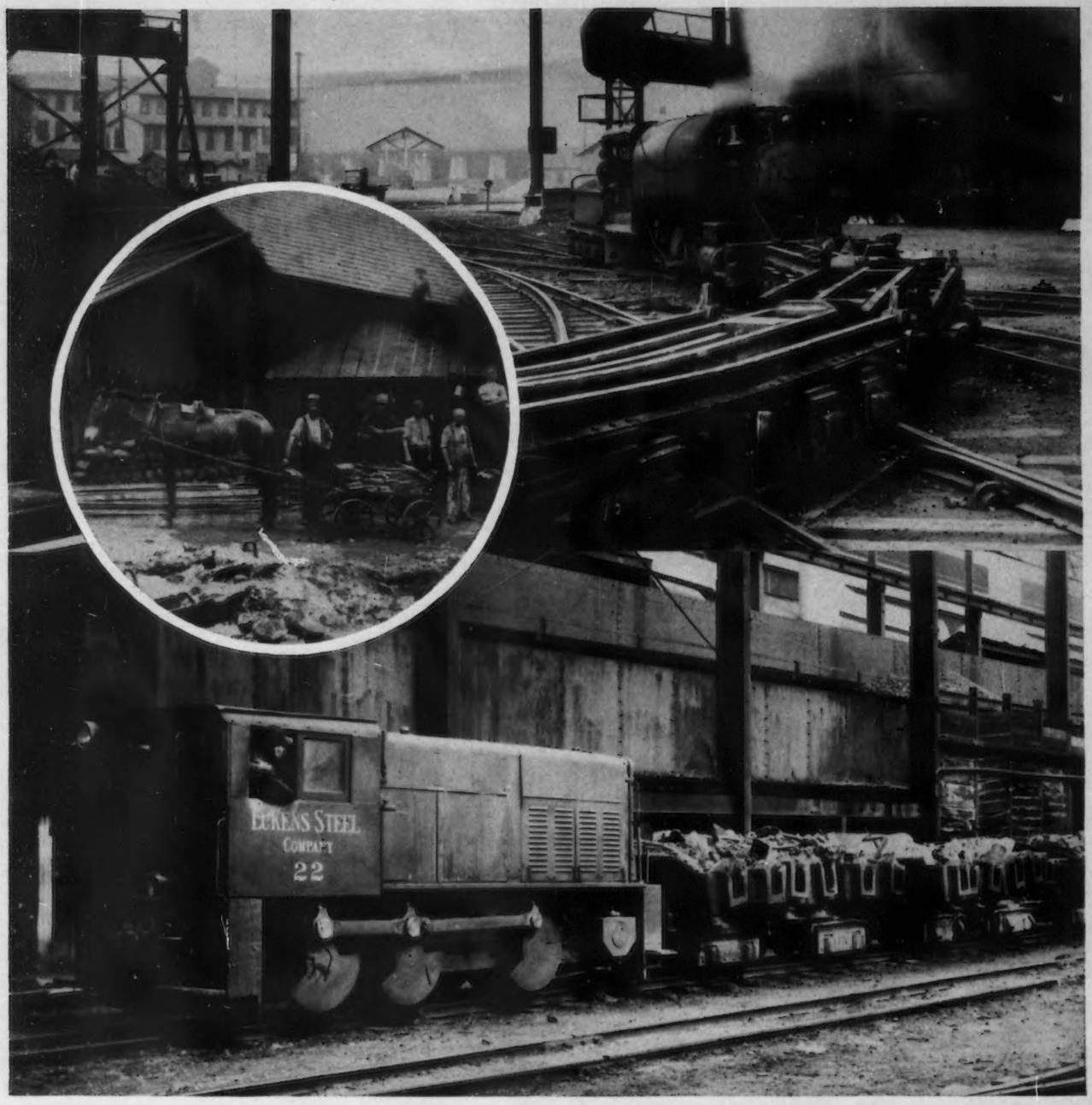
In **THE OPEN HEARTHS**

OF THE WORLD'S LARGEST PLATE MILL–

In Lukens' open hearths and soaking pits, as in the plants of many other leading steel companies, you'll find the products of Harbison-Walker Refractories Company, world's largest producer of refractories.

HARBISON-WALKER REFRACTORIES COMPANY

PITTSBURGH, PENNSYLVANIA • OFFICES IN PRINCIPAL CITIES



VULCANS HAVE ELIZA'S JOB NOW!

Back in the good old days the entire interworks transportation system at Lukens consisted of the mule "Eliza" and the iron wagon here shown loaded with puddled bars.

With the growth of the Lukens Steel Company in tonnage and in the production of large, heavy plates, Eliza gave way to Vulcan locomotives—two of which appear on this page. These are doing the bigger job to the satisfaction of their owners.

The successful experience of Vulcan goes back a long way too—86 years. So we can appreciate the unbroken progress of the Lukens Steel Company during its 125 years of service.

VULCAN IRON WORKS, Wilkes-Barre, Penna.

The Sun Oil Company knows no better way to summarize Sunoco Cutting Oil's efficiency than to say it is used by leaders of the metal cutting industry. On performance, and performance alone, it has won recognition wherever machine tools are operated.

CENTURY AND QUARTER

★ And Lukens' Long Experience Selects Sunoco

As a producer of lubricants, Sun is privileged to contact many firms in many lines. It is a special privilege now to look backward—and forward—with Lukens Steel Company . . . Backward over many years of business relations . . . Forward to years, freighted with promise, which lie ahead. ★ ★ ★ And Sun takes pleasure in reporting long-continued use of Sun products by Lukens—not the least among them Sunoco Emulsifying Cutting Oil. That the Lukens' mechanical department should state its satisfaction with this cutting lubricant and report the fact that Sunoco "carries off very rapidly the frictional heat, and leaves a smooth, non-rusting finish" is indeed gratifying . . . and significant. ★ ★ ★ *SUN OIL COMPANY, Philadelphia.*

Operation: Milling keyway on drive shaft for 206" mill.
Machine: Brown and Sharpe Milling Machine.
Material: Forged steel; .30 carbon.
Feed: 5/8" per min. **Speed:** 280 r.p.m.
Depth of Cut: 3/8". **Width:** 1½".
Lubricant: 1 part Sunoco to 8 parts water.

In Oval: The old mill of Lukens Steel Company. Bottom Pictures: Two views from today's Lukens plant, showing use of Sunoco in machine shop.

Operation: Drilling hole in front table roll gudgeon for 206" mill.
Machine: Foedick Drilling Machine.
Material: Cast steel.
Feed: .013" per revolution. (255 r.p.m.)
Size of Drill: 1½".
Lubricant: 1 part Sunoco to 8 parts water.

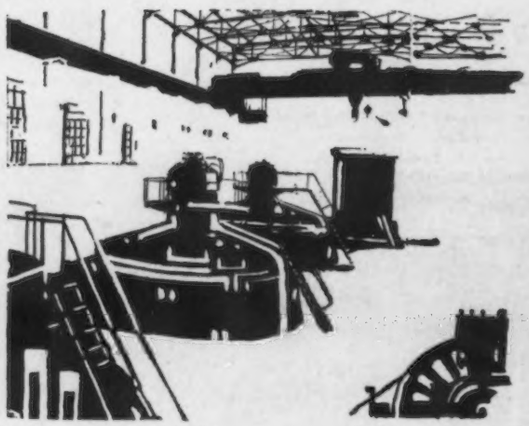
. . . A MUTUAL ANCESTOR

Old flywheel of Lukens Steel Company's original mill, Coatesville, Pa.

THIS historically interesting water-driven flywheel symbolizes the mutual parentage of the steel and electric industries. Though long outmoded, it is still an embodiment of progress. For it ended the days in steel-making which saw workmen rushing to the water-wheel and jumping on the rim to keep the mill operating whenever a specially difficult piece of work threatened to stop the wheel and so cause "stickers" and possibly fire cracked rolls. . . .

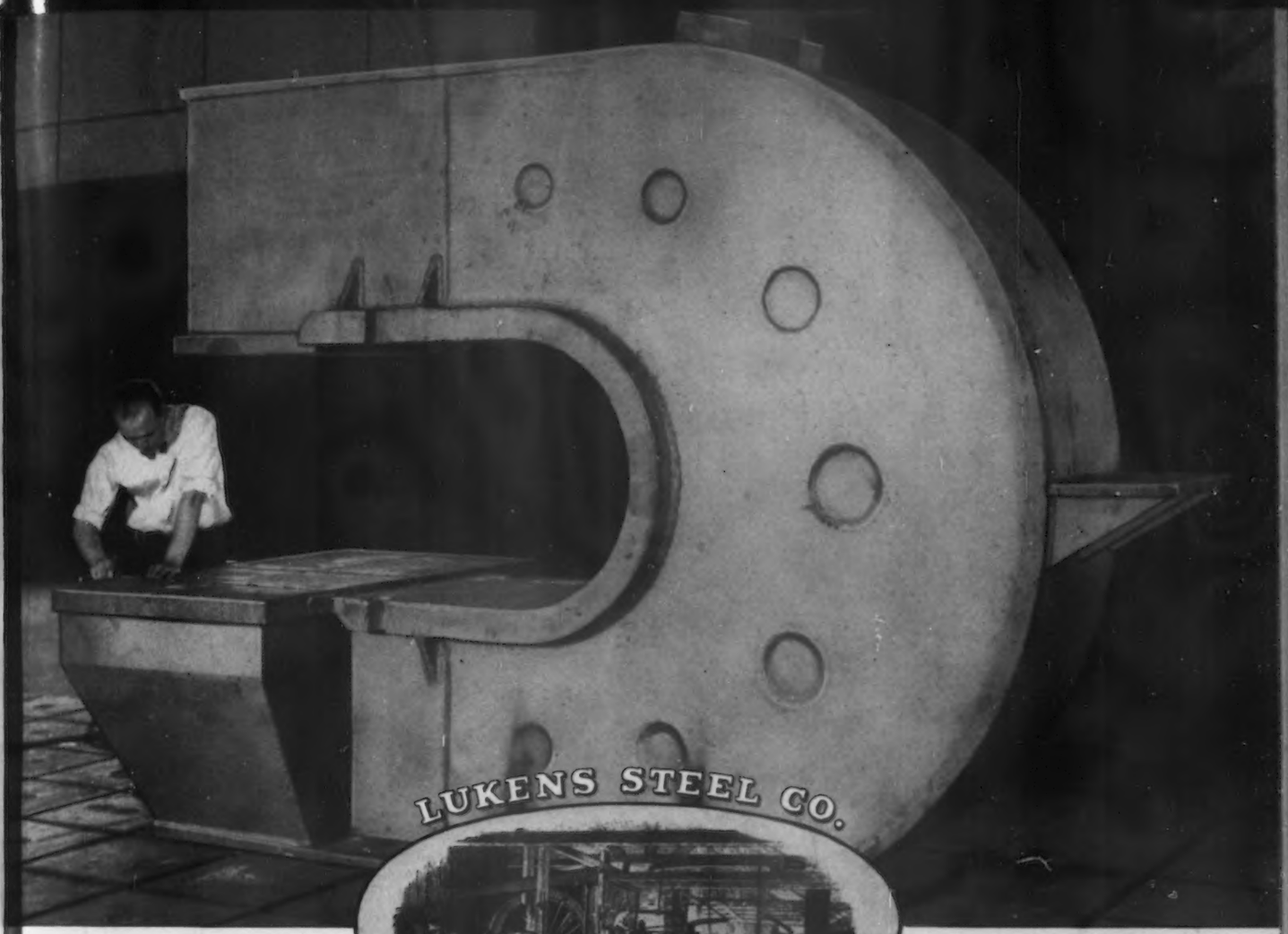
IN congratulating the Lukens Steel Company upon its One Hundred and Twenty-fifth Anniversary, this Company speaks as a fellow-pioneer. The old water-wheel of Brandywine Creek had counterparts on the Susquehanna from which the present pulsating electric system of this Company is a direct descendant.

Jointly achieving, both have come far since the early days of their beginnings.



PHILADELPHIA ELECTRIC COMPANY

A Pioneer in Voluntarily Establishing Low Rates for All Electric Service



Frame for self-contained, 100-ton hydraulic straightening press. Fabricated with Murex by Lukenweld. Weight: 9850 lbs.

FIRST to make Boiler Plate—
FIRST to use Murex

In 1820, to meet the demands of the new steam engines, Lukens Steel Company produced the first boiler plate in America. Since then, it has maintained a leading position in an industry remarkable for tremendous expansion and frequently revolutionized by such developments as: the introduction of T rails in 1844, the discovery of the Bessemer process in 1856, the first steel frame structure in 1874, the growth of the open hearth process beginning in 1890, the increasing use of alloy steels since 1900, and, recently, the perfection of fabricating methods employing flame-cut shapes and welded construction. Today, Lukens operates the world's largest plate mill;

Model bulkhead. 3/16" plates, Murex-welded. Tested to 131 ft. head of water

has a separate division specializing in heavy welded steel products.

It is significant that the Lukenweld division of this pioneering company was the first large fabricating concern in America to adopt Murex; that, ever since these heavy all-mineral coated electrodes were first introduced, it has been a consistently large user.

The reasons why Lukenweld and other large fabricators weld with Murex are made clear in a comprehensive booklet. May we send you a copy?

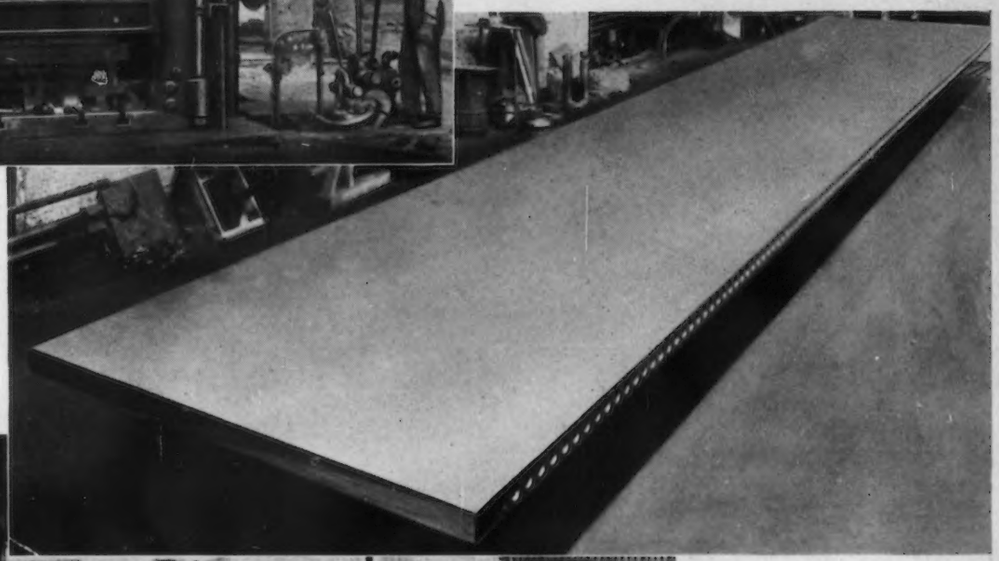
METAL & THERMIT CORPORATION
120 Broadway, New York, N. Y.
Albany • Chicago • Pittsburgh • So. San Francisco • Toronto

MUREX

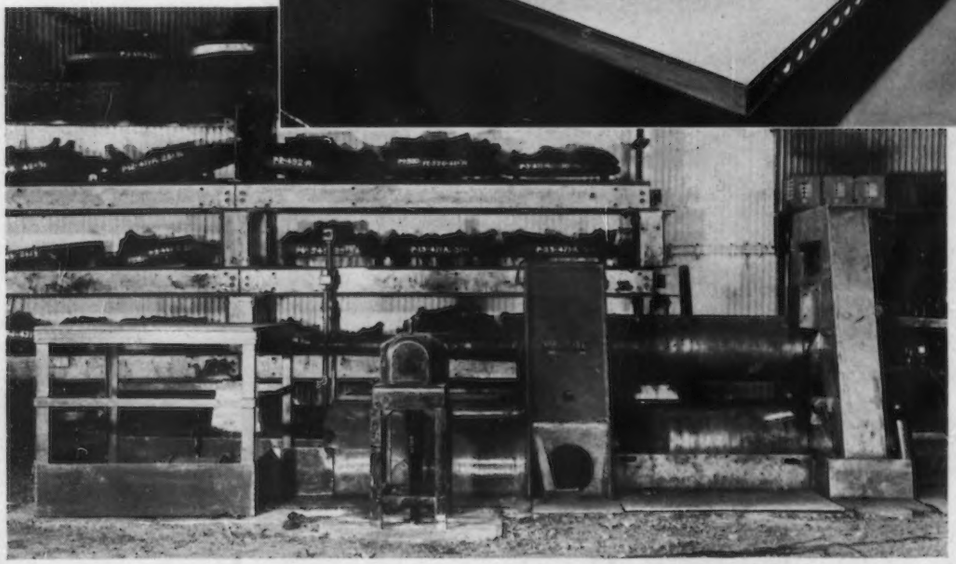
HEAVY MINERAL COATED ELECTRODES

Congratulations to LUKENS on their 125th Birthday from SOUTHWARK

At left: Southwark 1500 Ton Flanging Press at Lukens Steel Co. Weight—250,000 lbs.



At right: A Southwark Rolled Steel Steam Platen (for rubber tile press) 443½" x 74½" x 3½". Weight, 33,500 lbs. Plate rolled from an 80,000 lb. ingot on Lukens' largest plate mill in the world.



At left: Southwark Bending Roll at Lukens Steel Co. for bending 48 in. by 3 in. thick cold plate.

BALDWIN SOUTHWARK CORPORATION . . . PHILADELPHIA

A Scene In The Lukens Mill—

Shearing Round Heads The Quickwork Way!

Shearing a round head from a square plate or sheet looks simple, but mill men know it is difficult. If the center is only a few thousandths out of proper location, the result is a spiral instead of a circle.

To correct this (if you are not using Quickwork equipment) you must adjust the fixed center by guess-work and try again because the exact center location cannot be determined visually or by measurement.

And when shearing heavy round heads from square plate ¼" or heavier you have to first take the plate to a squaring shear and trim off the four corners. Even then the job is a difficult one.

The Quickwork Rotary Shear and Circular Attachment overcomes *all* of these difficulties. A patented self centering device finds the exact center location quickly and automatically without "cut and try" methods. It shears round heads from square plates up to 1" thick throughout the 360° in one operation at 70 ft. per min. And it is *not* necessary to first trim off the corners. See illustration.

THE QUICKWORK CO. *(H. Collier Smith, Jr., Pres.)* **ST. MARYS, OHIO**

"QUICKWORK"

(REGISTERED IN U.S.A. AND FOREIGN COUNTRIES)

EQUIPMENT FOR STRAIGHT, IRREGULAR, CIRCULAR AND ELLIPTICAL CUTTING, BEVELING AND FLANGING OPERATIONS
CABLEGRAMS "QUICKWORK" ALL CODES

"WORLD'S LARGEST PLATE MILL"

uses Pickling Tanks with Tie-Rods, Washers and Nuts of

MONEL METAL

● *In March 1928, G. Woolford Wood Tank Manufacturing Company installed two of these 5¾" yellow pine pickling tanks at Lukens Steel Company, World's Largest Plate Mill, Coatesville, Pa. These tanks are 16' 2" square by 4' 6" deep and are kept tight with Monel Metal tie-rods, washers and nuts, which are now in practically as good condition as when installed.*

7 years at Lukens finds them practically as good as when new!

LUKENS STEEL COMPANY, Coatesville, Pennsylvania, like many another steel mill, knows from experience the long life to be had from Monel Metal tie-rods, washers and nuts on pickling tanks.

In many installations Monel Metal tie-rods, washers and nuts outlast the tank, and are used over again, either in new tanks, or for pickle pins or eye-bars. Ten years' service is not uncommon.

Whether for use with tanks holding sulfuric, hydrochloric, hydrofluoric, or mixtures of these acids, Monel Metal's resistance to corrosion, and its great strength, are vital.

Equally as important as *holding* a pickling-tank together is the necessity of *keeping it tight*. The threaded portions of Monel Metal rods and nuts permit drawing up, even after long years of service. This resulting tightness means a minimum of acid loss.

Recent impartial tests show that after a year's service, Monel Metal tie-rods will carry *more than three times* the load of tie-rods of other metals for this service.

Write for our new 24-page booklet . . . "Equipment Designs for the Pickle House."

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York, N. Y.

Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

News Flashes

DIRECT FROM THE FIELD

FINE CUT-GLASS is dipped into a mixture of hydrochloric and sulphuric acids to remove marks of cutting stones and to give glass its lustre. The glass is placed in baskets made from cold-drawn Monel Metal rod which resists the effect of the acids.

HOT-ROLLED Monel Metal flats are used for wearing strips on the operating mechanism of Rock Island Dam No. 15, Rock Island, Illinois. Since chains are dragged over these strips a material that will not rust and one that will resist wear and abrasion is required . . . hence the Monel Metal.

TO REPAIR the corroded lower ends of steel tubes used in brine heaters, a large salt company cuts off the corroded portion and welds on a short length of Monel Metal tubing.

BY THE ADDITION of 3% nickel to wrought iron made by the A. M. Byers Process, the yield point is raised approximately 50% and the tensile strength 25%, this with no appreciable loss of ductility. Used for sucker rods in the oil fields, this new material shows remarkable resistance to corrosion fatigue.

TWENTY-SIX MILLION is the modulus of elasticity for Monel Metal. This is one of the reasons why Monel Metal shafts have been turning Monel Metal propellers on the "Siwash," U. S. patrol-boat, for more than five years. Thus is Commander Sweet getting uninterrupted service, and saving the Service considerable money.

BOULDER DAM, one of the great engineering feats of the century, is modern to its last detail . . . even the house from which the 150-ton cableway is controlled. The engineers insisted on a control house that would last as long as Boulder Dam itself . . . it is built entirely of Monel Metal.

Built by

MORGAN ENGINEERING

Careers of companies, like men, are indissolubly linked by working together on common problems, the solving of which adds to the sum total of experience of both. It has been the privilege of the MORGAN Engineering Company, itself a pioneer in some phases of development in the steel industry, to serve LUKENS Steel Company for more than a generation past. MORGAN equipment like the LUKENS reputation has endured, still serves well by virtue of its integrity, a quality that has made LUKENS' opportunities and its future show steady growth for more than a century. Here is a MORGAN 1000-ton Hydraulic Flanging Press pressing brake drums for oil well drilling equipment in the LUKENS Flanging Department. The drums measure 51⅝" I. D. x 10⅜" deep x 1½" thick.

THE MORGAN ENGINEERING CO., Alliance, Ohio
Pittsburgh, 1420 Oliver Bldg. New York, 11 W. 42nd Street

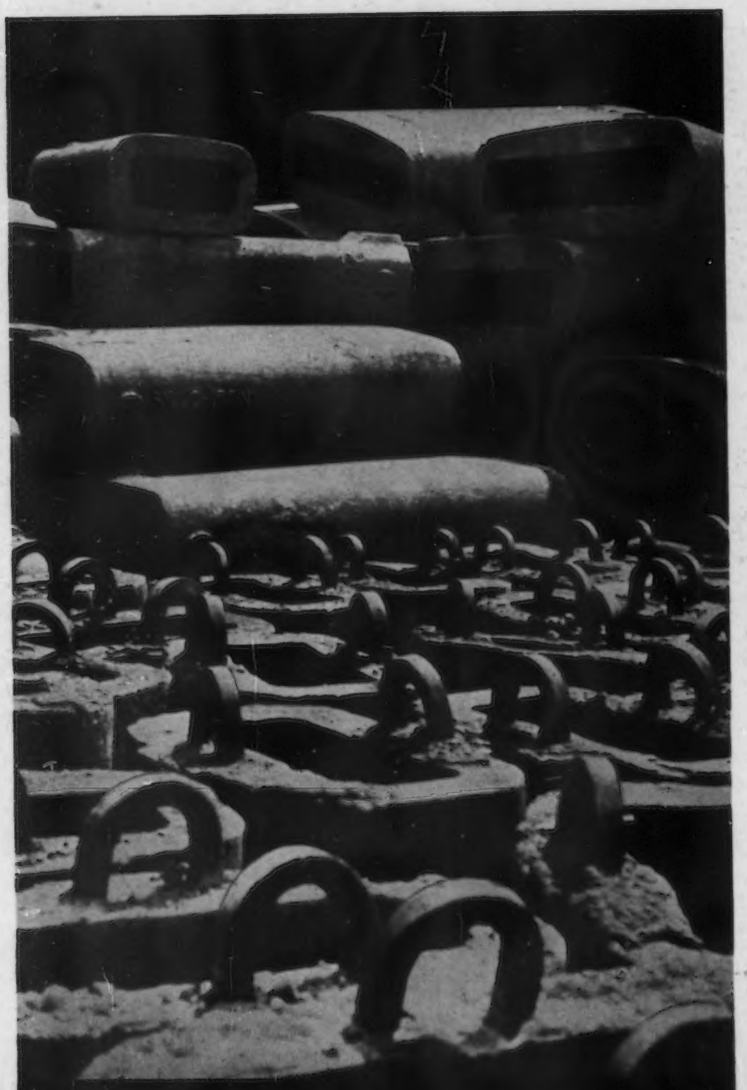
MORGAN PRODUCTS

Plate Mills • Blooming Mills • Continuous Mills • Structural Mills
Electric Traveling Cranes • Charging Machines • Ladle Cranes
Ingot Stripping Machines • Soaking Pit Cranes • Steam Hammers
Steam Hydraulic Forging Presses • Special Machinery for Steel Mills

DESIGNERS • MANUFACTURERS • CONTRACTORS

VULCAN

helped LUKENS to solve one of the world's toughest mold jobs



★ The Problem

52 different sizes of molds . . . . mold weights ranging from 1750 pounds to 110,000 pounds . . . . nearly all wide slab sections ranging in size from 8″ x 10″ to 40″ x 90″.

Molds were scrapped mainly because of stress-cracking of the walls before fire-cracking was well developed. Then Vulcan engineers, working with Lukens, applied our proved principles of mold design . . . . *found the answer.*

★ The Solution

Established formulas . . . . to compute the proper ratio of mold wall to ingot area for heat absorption . . . . to distribute the metal in the mold walls for correct radiation and stress control . . . . and the inherently high strength and heat-resistance of Cupola-Controlled VULC-IRON accomplished the rest.

★ The Result

An increase in mold life of as much as 25% . . . . reduced stripping troubles . . . less surface defects.

We are proud to have helped Lukens solve one of their operating problems, and glad to help celebrate their completion of a hundred and twenty-five years of successful operation.

VULCAN MOLD & IRON CO.
Latrobe, Pa.

INITIATIVE and DEVELOPMENT in the STEEL INDUSTRY

THE Steel Industry appreciates the initiative and development work of manufacturers who contribute to the quality of their products and the efficiency of their production methods.

It is therefore significant that in welcoming this opportunity to felicitate the Lukens Steel Company on their One Hundred and Twenty-Fifth Anniversary, we can also announce that, for the past quarter century, it has been our privilege to enjoy pleasant business relations with them.

The "Complete Refractories Service" which General Refractories Company, by reason of its extensive sources of raw materials and manufacturing facilities, is able to furnish to refractories users is well known to those of our customers whom we have had the pleasure of serving over such a period of years.

GREFCO

Fire Clay Brick
Silica Brick
Magnesite Brick
Chrome Brick
Magnesite Grains
Chrome Ore
Suspended Arches and Walls
Silicon Carbide Brick
High Temperature Cement
Plastic Fire Brick
Plastic Chrome Ore
Acidproof Brick
Miscellaneous Refractory Materials

GENERAL REFRACTORIES COMPANY

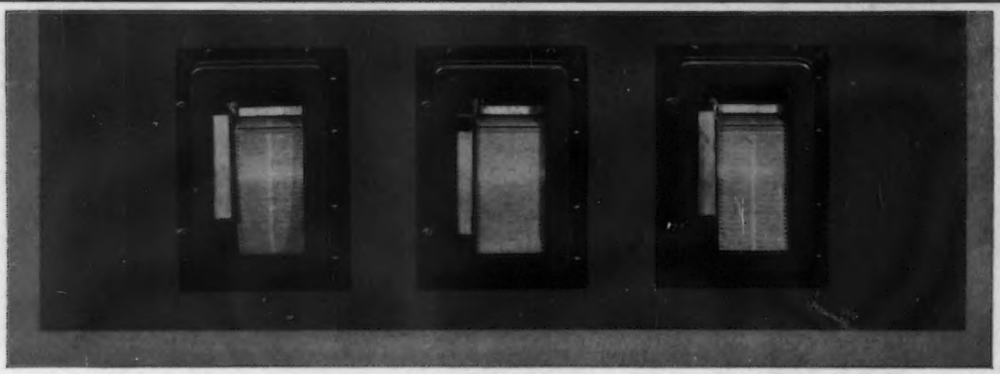
PHILADELPHIA, PENNA., U. S. A.

Baltimore · Birmingham · Buffalo · Chicago · Cleveland · Detroit · Houston
Indianapolis · Milwaukee · New York · Pittsburgh · San Francisco · St. Louis · Tulsa

A COMPLETE REFRACTORIES SERVICE

5544A

Control underlies quality



Instrument board for No. 24 Furnace in Open Hearth Building No. 3, Lukens Steel Co., Coatesville, Pa., showing, at top, two Bristol's Recording Pressure Gauges, and two Bristol's Recording Thermometers, at bottom, three Bristol's Strip Chart Recording Pyrometers. Other Bristol's are to be found in the boiler room and fuel engineer's office.

WHY is it that some companies live and prosper, while only too many others are here today and gone tomorrow? Why do some continue to progress and forge ahead, while others so frequently fall by the wayside?

The answer is not hard to find. Experience teaches that it is keeping faith with the buyer by painstakingly guarding product quality. Only in this way is it possible to win and hold product acceptance and good-will so essential to business growth.

This calls for precision processing. It requires regulation, within prescribed tolerances of quality, of every industrial operation. It demands the production control which Bristol's Instruments make possible in the Lukens mill as in the plants of many other established leaders in the industry.

Concerns who insist on product quality choose Bristol's.

THE BRISTOL COMPANY, WATERBURY, CONNECTICUT

Branch Offices: Akron, Birmingham, Boston, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco. Canada: The Bristol Company of Canada, Ltd., Toronto, Ontario. England: Bristol's Instrument Co., Limited, London, S. E. 14

TRADE MARK

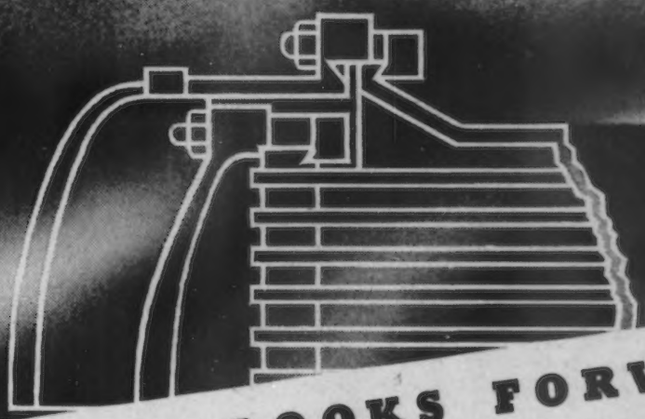
BRISTOL'S

REG. U. S. PAT. OFF.

PIONEERS IN PROCESS CONTROL SINCE 1889

MOLY

increases steel's resistance to creep



LUKENS LOOKS FORWARD

One hundred and twenty-five ripe years have not dimmed the Lukens Steel Company's vision. We quote from their Mr. L. P. McAllister's talk, "Modern Materials for High Pressure Boiler and Pressure Vessels," delivered before the annual meeting of the National Boiler and Pressure Vessel Inspectors in Chicago, May 16, 1935:

"Due attention is just beginning to center around carbon-molybdenum plate steel. By this is meant carbon under 0.25% and molybdenum between 0.40-0.60%. Tubes of this grade have been successfully used and the plate industry is now arousing to the advantage that molybdenum gives; i.e., definitely improved physical properties at elevated temperatures. One has only to scan the creep values of carbon-molybdenum steel and compare them with values on steels of equivalent room temperature strength, and readily the imparted improvements can be noted. Advantage has been taken of this element in Europe for years. In plate and vessel material, room temperature strength of 75,000 pounds per square inch can be easily obtained."

IN MANY manufacturing processes, where ordinary alloy steels are used, high temperatures exact a heavy toll in replacements and repairs. Molybdenum, the most potent high-temperature alloy ever used in steel, has proved that such failures can frequently be prevented and that even higher and more effective temperatures can be employed.

An outstanding example is "Cromol," containing 4% to 6% of chromium and 0.50% "Moly," now generally used in the tubes for oil cracking stills. Permitting greatly elevated temperatures, it has speeded up refinery output. In boiler tubes of carbon steel Moly allows reduction in wall thickness, thus saving steel. The thinner walls also save fuel, through better heat transmission. Moly irons are ideal for parts which are subjected to hard wear and corrosion as well as intense heat.

Moly never fails to improve steel. Investigate its amazing performance and economies. The modern Climax laboratories in Detroit and a staff of metallurgists are at your service. Write for complete information about our free engineering and experimental co-operation and an interesting book: "Molybdenum." Climax Molybdenum Co., 500 Fifth Avenue, New York City. (In Canada: Railway & Power Engineering Corp., Ltd.)

CLIMAX Mo-lyb-den-um

The MARYLAND BOLT *and* NUT COMPANY

Complete Line
BOLTS—NUTS—LAGS
THREADED RODS

MD

Manufactured From
COMMERCIAL AND ALLOY
STEEL — BRASS — BRONZE

PLANT AND OFFICE
MT. WASHINGTON
BALTIMORE, MARYLAND

We Congratulate
LUKENS STEEL COMPANY
On Their 125th Anniversary

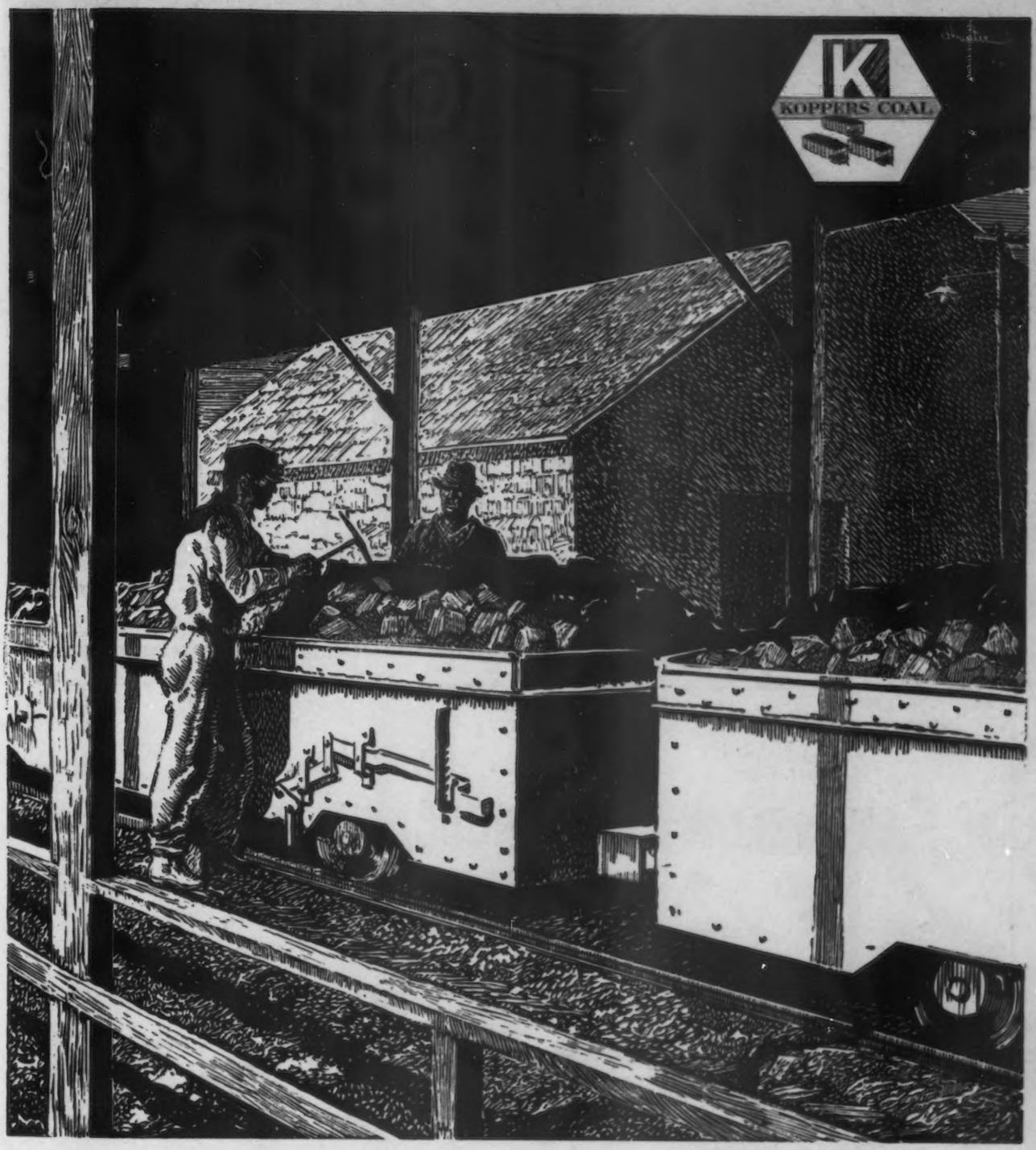
Hickman Williams & Co.

INCORPORATED

PIG IRON
FERRO-ALLOYS
FLUORSPAR
COAL - COKE

Chicago Detroit Minneapolis New York Cincinnati Cleveland Philadelphia Pittsburgh St. Louis

THERE'S A KOPPERS COAL FOR EVERY PURPOSE



CONGRATULATIONS TO THE LUKENS STEEL COMPANY ON ITS ONE HUNDRED TWENTY FIFTH ANNIVERSARY

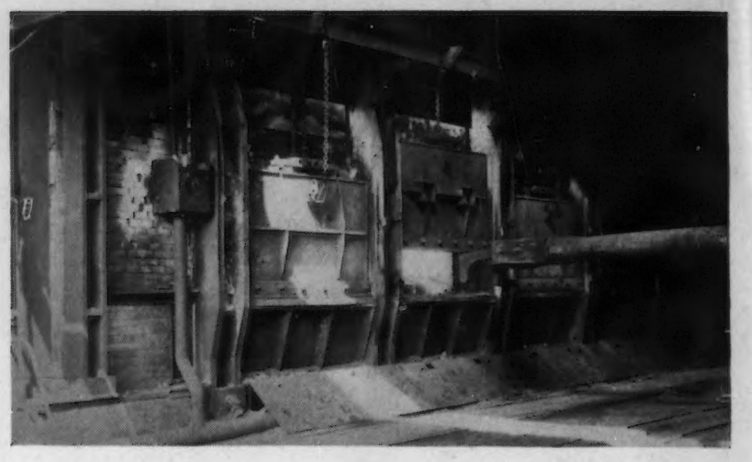
THE KOPPERS COAL COMPANY, INC.

General Offices:
Koppers Building : Pittsburgh, Pa.

KOPPERS

Atlanta Chicago Cincinnati Cleveland
Detroit New York Norfolk Philadelphia
Winston-Salem

Heating furnaces in the 84" mill at Lukens, lined with Valentine XX Fire Brick.



VALENTINE XX BRICK

Serve for 55 Years in the "World's Largest Plate Mill"

Since 1880—for the past fifty-five years, Valentine XX Fire Brick have been used in soaking pits, heating furnaces and other furnace equipment in the mills of Lukens Steel Company.

Valentine experience can help you solve your refractories problems. Try Valentine XX Fire Brick on your next re-lining job.

Fifty-five years of consistent purchase and use of Valentine XX Fire Brick by Lukens is eloquent evidence of the satisfactory service of Valentine Brick under varied and severe service conditions.

M. D. VALENTINE & BRO. CO.

WOODBRIDGE, N. J.

WINSLOW-KNICKERBOCKER COAL CO.

Distributors

ANTHRACITE

COAL

BITUMINOUS

Suppliers of Steam Coal to Lukens, the "World's Largest Plate Mill"

1115 BROAD STREET STATION BLDG., PHILADELPHIA

NEW YORK OFFICE: 17 BATTERY PLACE

BALTIMORE OFFICE: 1203 HEARST TOWER BLDG.

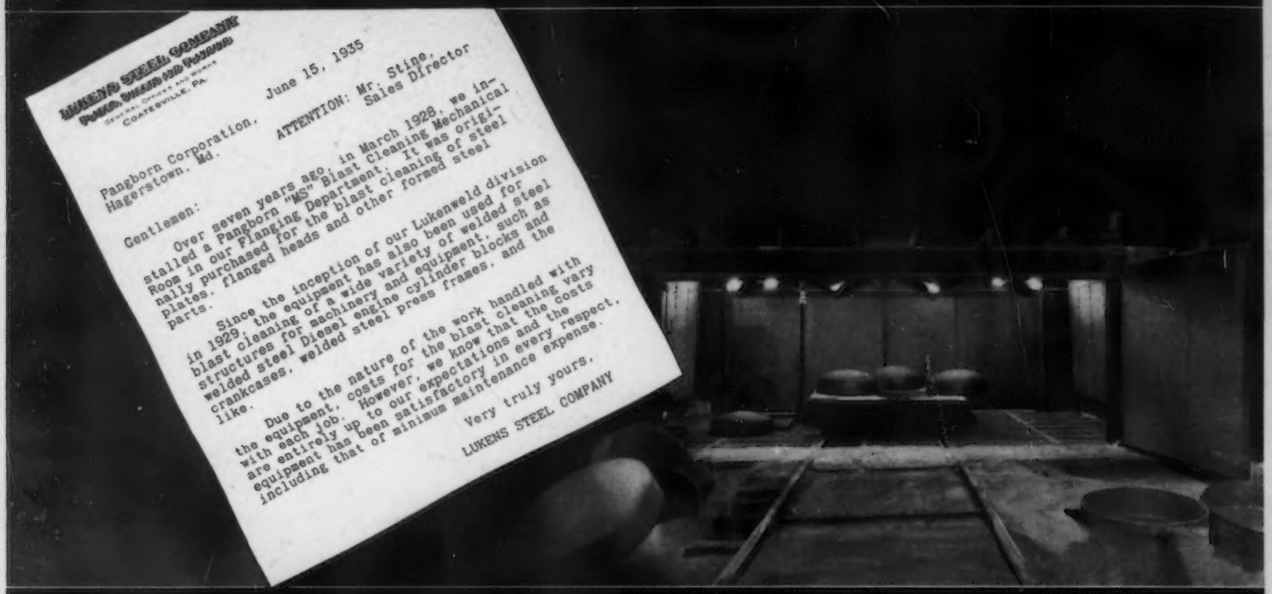
On its growth . . . its quality standards . . . its exceptional facilities, including the world's largest plate mill and the world's largest shear—where Heppenstall knives shear plates 18 feet wide and 2 inches thick in one stroke. Serving Lukens Steel for 50 years, Heppenstall looks forward to a continuation of this valued relationship.

H

HEPPENSTALL COMPANY

PITTSBURGH · DETROIT · BRIDGEPORT

LUKENS DEPEND UPON PANGBORN
FOR EFFICIENT BLAST CLEANING EQUIPMENT


LUKENS STEEL COMPANY
Coatesville, Pa.
June 15, 1935
Pangborn Corporation,
Hagerstown, Md.
ATTENTION: Mr. Stine,
Sales Director
Gentlemen:
Over seven years ago in March 1928, we installed a Pangborn "MS" Blast Cleaning Mechanical Room in our Flanging Department. It was originally purchased for the blast cleaning of steel plates, flanged heads and other formed steel parts.
Since the inception of our Lukenweld division in 1929, the equipment has also been used for blast cleaning of a wide variety of welded steel structures for machinery and equipment, such as crankcases, welded steel Diesel engine cylinder blocks and like.
Due to the nature of the work handled with the equipment, costs for the blast cleaning vary with each job. However, we know that the costs are entirely up to our expectations and the equipment has been satisfactory in every respect, including that of minimum maintenance expense.
Very truly yours,
LUKENS STEEL COMPANY

PANGBORN CORPORATION

The World's Largest Manufacturer of Blast Cleaning and Dust Collecting Equipment

HAGERSTOWN - - - - MARYLAND

PARDEE & CURTIN LUMBER CO.

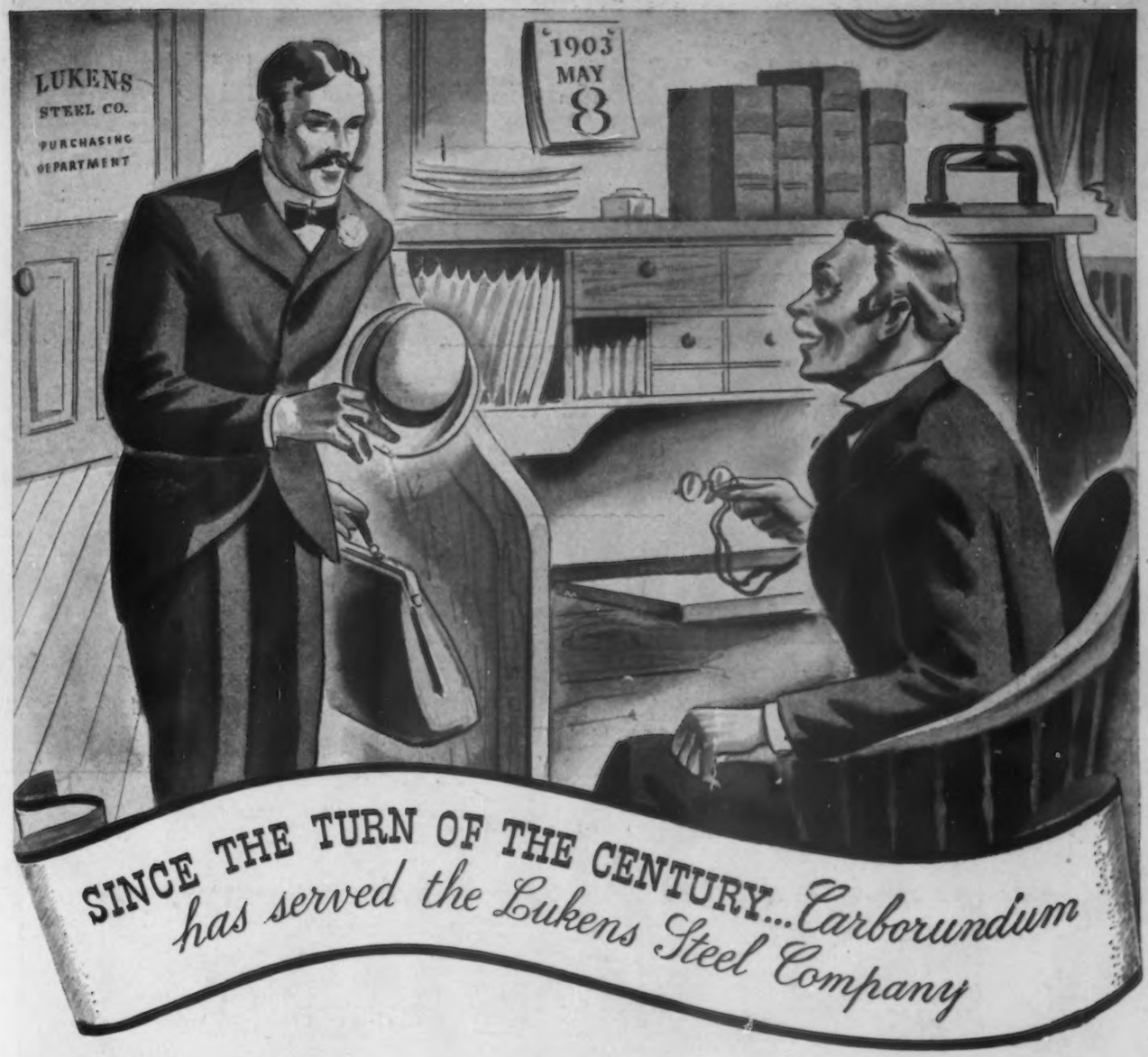
Miners and Shippers

BERGOO

SEWELL SEAM

COAL

MINES: BERGOO, WEBSTER COUNTY, W. VA.
SALES OFFICE: MARKET STREET NATIONAL BANK BLDG., PHILADELPHIA, PA.



THIRTY-TWO years ago the Lukens Steel Company installed its first Carborundum Brand Wheel. It has used Carborundum Brand Wheels ever since. Today they are used in the Lukens' machine shop, knife grinding department and roll grinding house.

The Carborundum Company, oldest producer of manufactured abrasives, considers this record of service a great tribute from the oldest company in the steel and iron industry in the United States.

But such a record is only in part evidence of the quality of Carborundum Brand Products. It is also evidence of the intelligent use of Carborundum Research facilities by the Lukens Steel Company.

This close cooperation has permitted detailed study of individual problems and the immediate application of new products and new grinding methods.

These same products and these same research facilities are available to all industrial plants.

THE CARBORUNDUM COMPANY

NIAGARA FALLS, NEW YORK

WHEELS....GRAINS....COATED ABRASIVES

Carborundum is a registered trade-mark of The Carborundum Company

~ ROLLING MILL LUBRICANTS ~

OVER FORTY YEARS MAKING SPECIAL PRODUCTS FOR SPECIAL NEEDS

WE HAVE HAD GREAT PLEASURE IN SUPPLYING OUR PRODUCTS TO LUKENS STEEL CO. FOR MANY YEARS

COLUMBIA REFINING CO.

of NEW YORK

LONG ISLAND CITY
N. Y.

JERSEY CITY
N. J.

ESTABLISHED 1889

LEE DIRECT HOT AIR HEATER

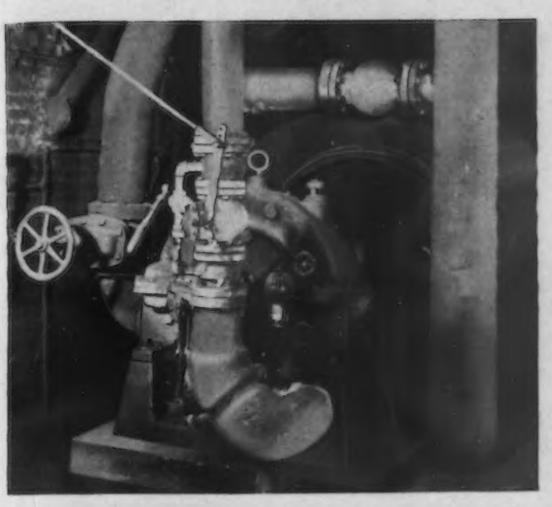
A Lee direct hot air tube type heater having a capacity of 5,000,000 B.T.U. per hour is installed at the Lukenweld division of Lukens Steel Company.

The Lee Heater is built in two types—the shell type for capacities up to 800,000 B.T.U. per hour, and the tube type for capacities up to 6,000,000 B.T.U. per hour. They can be fired with coal, coke, coke breeze, oil or gas—either automatically or manually controlled. A large number of these heaters have been supplied to steel mills, railroads (for car thawing houses), garages, shops, airports, factory buildings, etc.

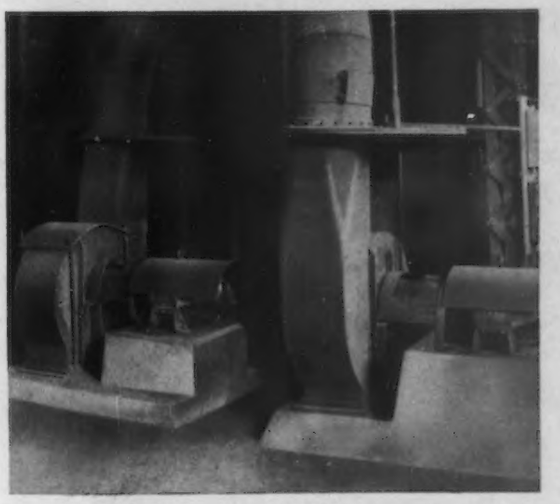
DRAVO-DOYLE COMPANY

Representatives PITTSBURGH PHILADELPHIA CLEVELAND

"All of your equipment --has given satisfactory service."



One of the Buffalo Draft Fans installed in the boiler room, Lukens Steel Co., in 1917, still serving efficiently.



Two of the six Buffalo Fans in the 84" Mill at Lukens Steel Co., installed in 1926.

To merit the approval of the Operating Department of a steel plant—a product must be able to take real punishment. That Buffalo fans have the commendation of Lukens Steel Company engineers is a source of satisfaction to us.

Because Buffalo fans are in use in nearly all the large plants in America and in all industries, we believe that we can supply the type of fan equipment which you will find most satisfactory in your plant. Our engineers are experienced in the ventilating and air conditioning problems of all industries. They welcome the opportunity to work with you.

Other Buffalo equipment for the metal working trades includes punches, shears, bar-cutters, bending rolls, and drills of all sizes.

Write for Bulletins.

BUFFALO FORGE COMPANY

492 Broadway Buffalo, N. Y.

In Canada: Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

Fans of all types
Air Conditioning, Cooling Equipment, Shears, Bar-cutters

FRANK SAMUEL & CO., INC.

SNOWDEN SAMUEL, Pres. FOUNDED 1893 S. A. COCHRAN, V.-P.

HARRISON BLDG., PHILA., PA.

Sold

LUKENS STEEL COMPANY

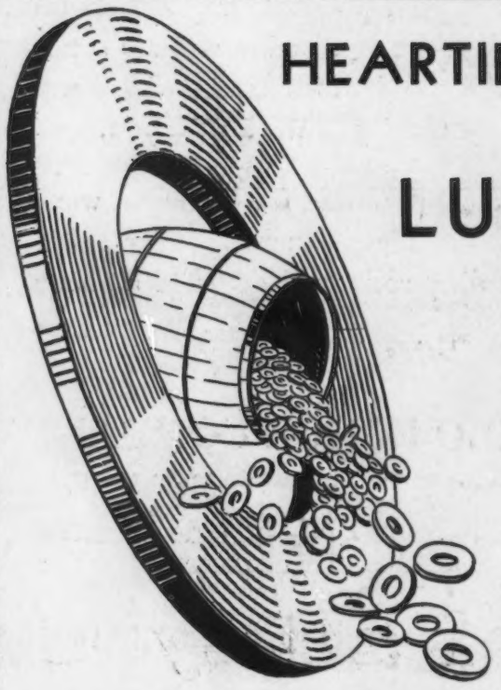
JAN. 18th, 1893

30,000 lbs. Muck Bar @ 23.50-314.23

At the 125th Anniversary of the founding of the Lukens Steel Company we believe that the above copy of invoice showing sale to this concern of 30,000 pounds of muck bar, is extremely interesting for many reasons.

It means that our Corporation have had the most pleasant business relations with Lukens Steel Company for over forty-two years. Also that this sale was made when they were making Genuine Wrought Iron Plates, and it is interesting to note that they are still making Genuine Hand Puddled Wrought Iron Plates from Muck Bar furnished by us from our Plant at Danville, Penna.

Also the fact that the price of Muck Bar is 2½ times today what it was in 1893, due mostly to the increase in puddlers' wages and freight rates, puddlers merely getting $1.50 a day during that period; whereas they are paid on a tonnage basis at the present time.



HEARTIEST CONGRATULATIONS

TO OUR NEIGHBOR

LUKENS STEEL CO.

125 YEARS OF *SERVICE*

"GOOD WILL IS THE DISPOSITION OF THE CUSTOMER TO RETURN TO THE PLACE WHERE HE HAS BEEN WELL *SERVED*"—*U. S. Supreme Court*

COATESVILLE PLATE WASHER CO.

COATESVILLE, PENNA.

General Offices—Widener Building—Philadelphia, Pa.

WASHERS FOR EVERY PURPOSE — "KNOWN FROM COAST TO COAST"

The Test of Time

The real test of equipment, or of companies, is the test of time.

Lukens Steel Company installed their first LANDIS Threading Machine in 1917 and it has operated ever since with a minimum of maintenance cost. That this machine has successfully stood the test of time is best indicated by the fact that when Lukens was in the market for a pipe machine about one year ago, LANDIS was purchased.

LANDIS Threading Equipment has the ability to make friends by giving the maximum in accuracy, production, and low costs—and to keep them by giving years of efficient service.

In preparing our congratulations to LUKENS STEEL on the successful completion of 125 years of business existence, we found that 107 years passed before they installed their first LANDIS. This was mostly our fault, since LANDIS Threading Equipment did not appear on the scene until 1903.

We know, however, that LUKENS' Maintenance Department — where LANDIS is used and liked—will agree with us that *"the first 107 years are the hardest."*

LANDIS MACHINE COMPANY, Inc.

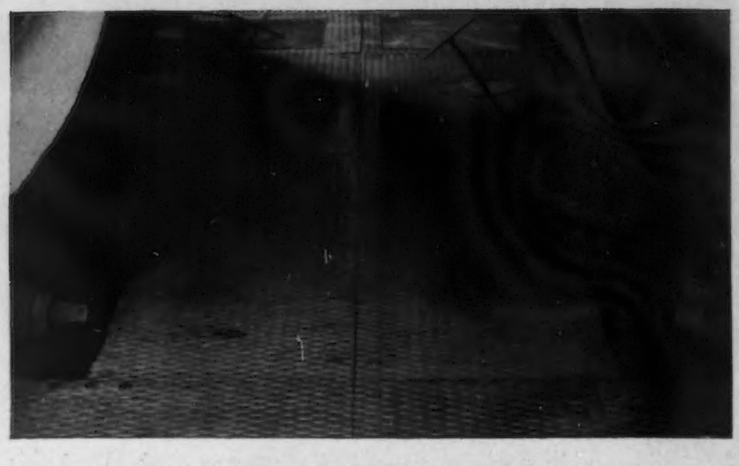
Waynesboro, Penna.

"A.W." Congratulates The

LUKENS STEEL COMPANY

on its

125th ANNIVERSARY



"A.W." ROLLED STEEL FLOOR PLATES

provide underfoot safety around the 20,000 H.P. engine driving the

"WORLD'S LARGEST PLATE MILL"

For more than 17 years the Lukens Steel Company personnel have had the benefit of maximum protection against accidents caused by slipping.

5 "A.W." FLOOR PLATE PATTERNS. SUPER DIAMOND, STANDARD DIAMOND, DIAMONDETTE, RIBBED PATTERN AND SUNKEN DIAMOND

ALAN WOOD STEEL COMPANY
CONSHOHOCKEN, PA.

109 YEARS' IRON AND STEEL MAKING EXPERIENCE

Congratulations and Birthday Greetings

to the

LUKENS STEEL COMPANY

COATESVILLE, PA.

They can look back on a century and a quarter of accomplishment and forward to even greater achievement.

We are proud of the part we play as a supplier of abrasive materials used by them to produce their quality products.

HY-TENS FOR STEEL

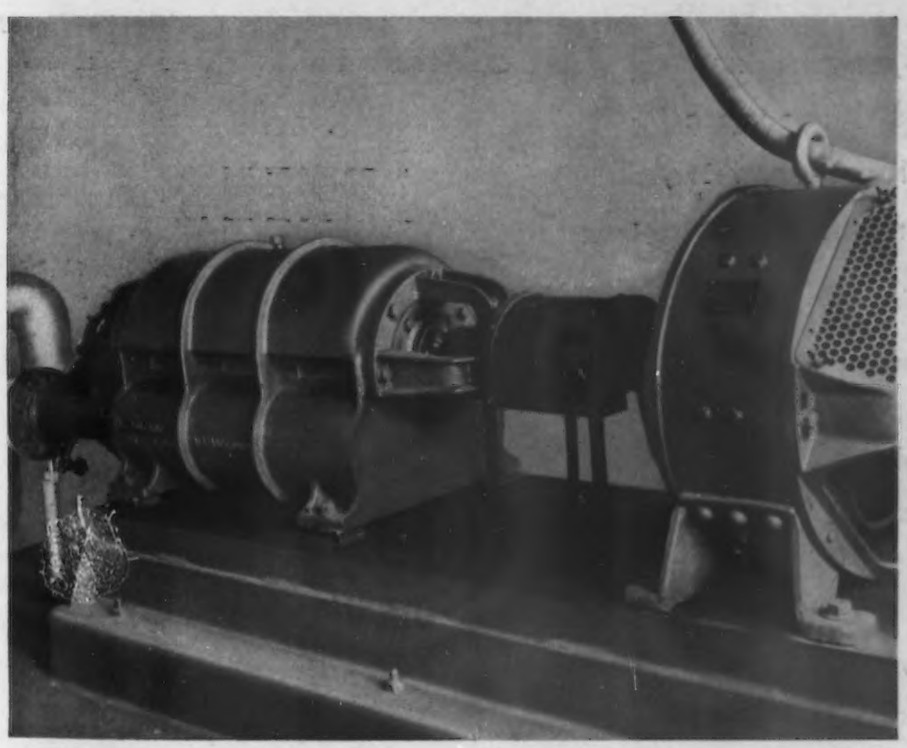
PRECISION GRINDING WHEEL CO., Inc.
PHILADELPHIA, PA.

TO-TENS FOR CASTINGS

125 YEARS OF LUKENS

PIONEERING AND ENTERPRISING PROGRESS HAVE INCLUDED THE FIRST STEEL MILL INSTALLATION OF THE

VOLCANIC FUEL OIL MILL



THE LUKENS INSTALLATION HAS A CAPACITY TO PROPERLY CONDITION 12,500 GALLONS OF BUNKER C RESIDUE FUEL OIL PER HOUR

ACID SLUDGE

•

TAR

•

PITCH

•

BLENDS

•

FUEL OIL

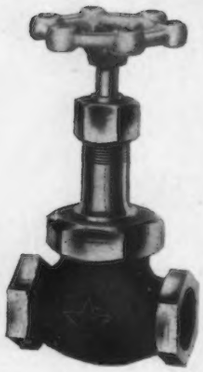
Advantages of Milled Fuel—

Elimination of clogged regulating valves, reducing valves and burners.
Reduction of fuel consumption through improved combustion.
The use of higher BTU fuel without sludge difficulties.
Assurance of uniform fuel at point of combustion.

A MILL FOR EVERY LIQUID FUEL SYSTEM FROM 30 TO 12,500 GAL. PER HOUR

THE VOLCANIC SPECIALTIES COMPANY ALLIANCE OHIO

CONSTANT IMPROVEMENT IN DESIGN, » » WORKMANSHIP, AND MATERIALS



Bronze Globe Valve

Powell Valves—because of distinctive design, materials, and workmanship—are the accepted standard for steam, water, air, gas and oil service.

Improved designs meet the changing demand created through new processes, high temperatures and pressures. Improved workmanship and materials insure safe, dependable valves under extreme operating conditions.

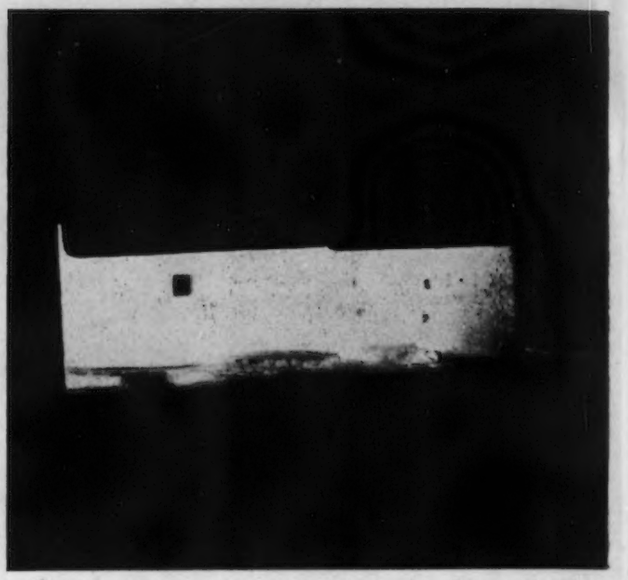
Iron Body Gate Valve

DISTRIBUTED AND STOCKED BY

MELRATH SUPPLY AND GASKET CO.

TIOGA & MEMPHIS STS., PHILADELPHIA, PA.

POWELL VALVES



A view of the interior of one of the heating furnaces in the flanging department at Lukens, photographed at night.

"OSCEOLA REFRACTORIES" *and* LUKENS

Just twenty-one years ago, in July, 1914, Osceola Silica and Fire Brick Co. received its first order from the World's Largest Plate Mill.

Uninterruptedly since that time, our business relations and friendship have continued most enjoyably.

Twenty-one years of selection of Osceola Clay Refractories, and their continued use in Lukens heating furnaces and checkers in open hearth furnaces and soaking pits, are evidence of the quality and serviceability of Osceola Clay Refractories.

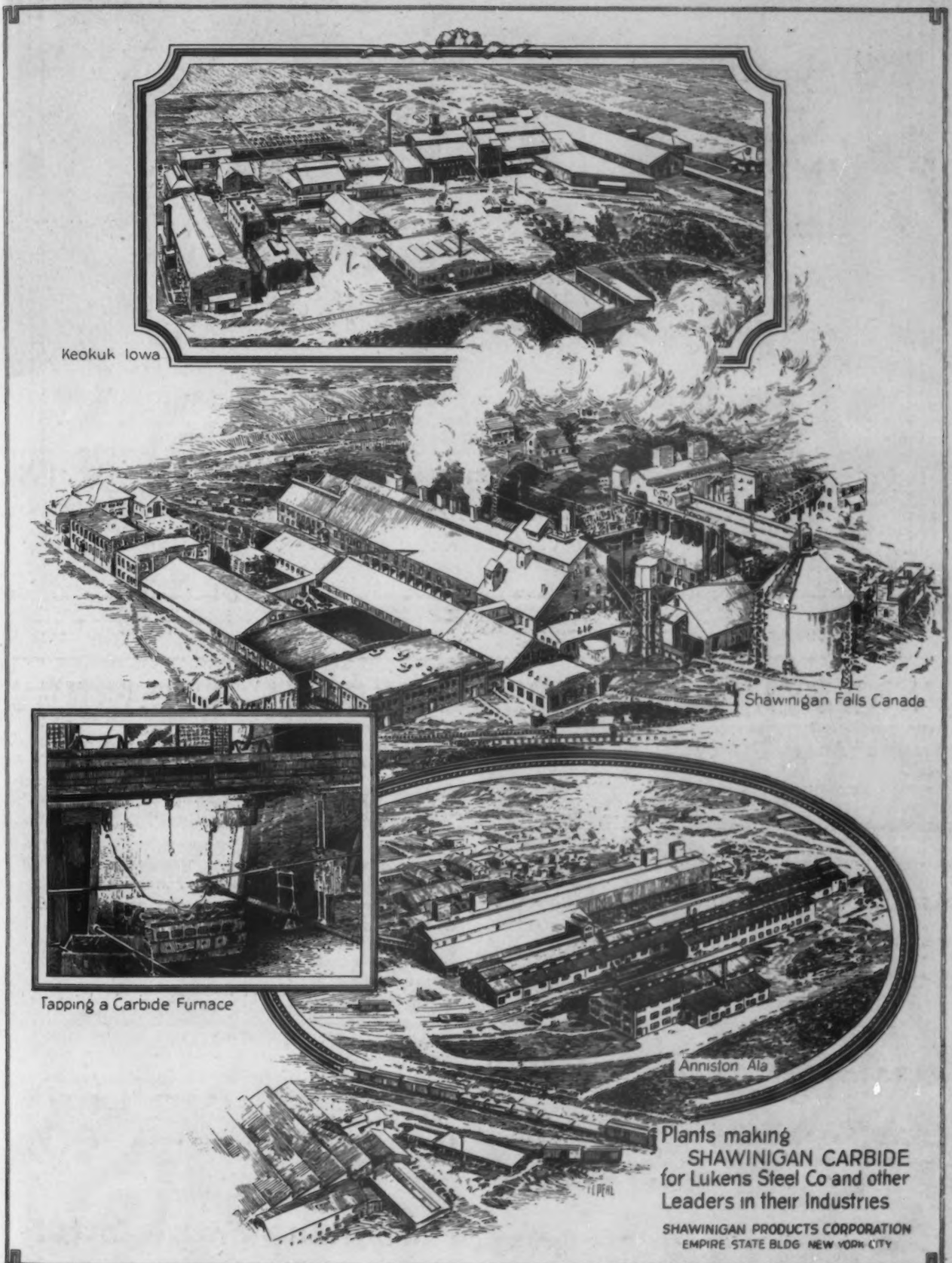
To Lukens, on the occasion of its 125th Anniversary, Osceola Refractories extends its sincere congratulations, and expresses the hope that the pleasant relations of the past may continue for many more years in the future.

OSCEOLA SILICA *and* FIRE BRICK CO.

Manufacturers of

OSCEOLA FIRE BRICK

Osceola Mills, Clearfield Co., Penna.


Keokuk Iowa
Shawinigan Falls Canada
Tapping a Carbide Furnace
Anniston Ala
Plants making
SHAWINIGAN CARBIDE
for Lukens Steel Co and other
Leaders in their Industries
SHAWINIGAN PRODUCTS CORPORATION
EMPIRE STATE BLDG NEW YORK CITY

J. GIBSON McILVAIN COMPANY

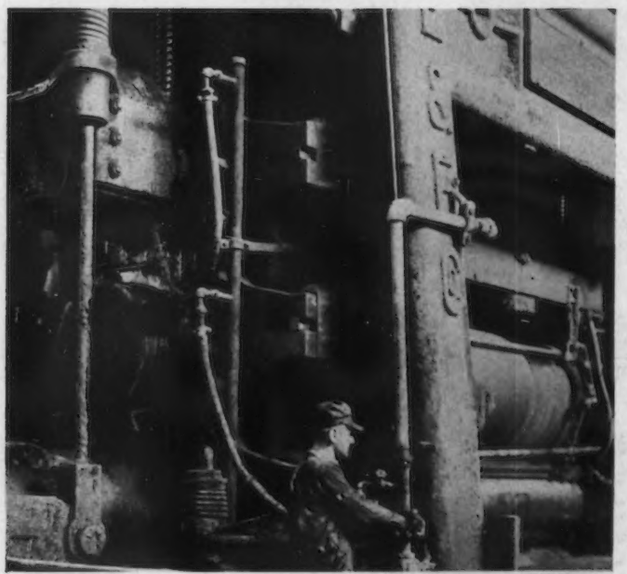
LUMBER

PHILADELPHIA, PENNA. *Since 1798*

Congratulations, Lukens Steel Company, on your One Hundred Twenty-fifth Anniversary.

Through all these years we have intimately known Lukens Steel Company management, and their long record could only have been attained through the high standard of business ethics so rigidly maintained.

PENNSYLVANIA NICKEL-BRONZE BEARINGS



Top, side and bottom roll neck bearings on the Lukens 206" mill are Pennsylvania Nickel-Bronze Castings.

A close-up view of the Pennsylvania Nickel-Bronze Bearings on the 140" mill tables at Lukens.

work in the

"World's Largest Plate Mill"

For many of Lukens Steel Company's 125 years of service to American industry, Pennsylvania Nickel-Bronze Bearings and other castings have been serving on the Lukens 206" mill and other equipment.

To us, it is a matter of pride that Pennsylvania Nickel-Bronze Castings have contributed their part in enabling Lukens to produce the high quality steel plates and other products with which the name, "Lukens" has been synonymous for years.

Making all grades of non-ferrous bearings and other non-ferrous castings for every purpose—to your specifications or our own analyses that are sold on a guaranteed service basis—Pennsylvania Bronze Foundry welcomes an opportunity to serve you. May we quote on your next requirements?

Pennsylvania Bronze Foundry

Seventh and Emerald Streets

Harrisburg, Pa.

Open Hearth Panel Board illustrates Brown Recording Pyrometers and CO_2 Meters measuring checker temperatures and combustion efficiency.

KEEPING PACE *With* PROGRESS

Brown Recording Potentiometers, Pyrometers, Flow Meters, Pressure Gauges, CO_2 Meters and Thermometers for control of Open Hearths.

Steam Temperatures are automatically controlled with Brown Recording Thermometer Controllers.

In the making of steel—high efficiency and resultant low costs are obtained more readily by the utilization of Brown instruments.

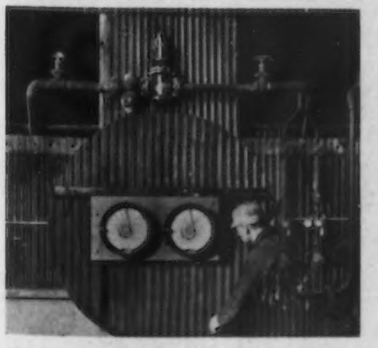
At Lukens Steel Co., Coatesville, Pa., which has the largest steel plate mill in the world, there are installed 125 Brown instruments for the measurement and control of temperatures, pressures, flows, liquid levels, speeds, etc.

Twenty years separate the installations of the earliest Brown Instrument and the latest. We are proud of the part entrusted to Brown equipment in the making of Lukens high quality steels.

The part that Brown instruments can play in reducing costs and increasing efficiency in your plant is the logical result of wide engineering experience in the application of recording, indicating and control instruments for blast furnaces, open hearths, soaking pits, heating furnaces—in foundries, rail, tube, sheet, rod and wire mills.

When you look for instruments best suited to your plant requirements, call in a Brown engineer. There is no obligation. Write The Brown Instrument Company, 4483 Wayne Avenue, Philadelphia, Pa. Offices in all principal cities. Canadian Factory—117 Peter St., Toronto, Canada.

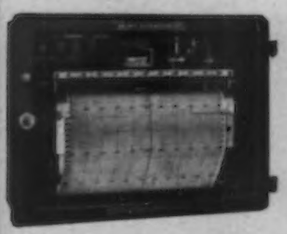
Space Heating Furnaces are automatically controlled by Brown Pyrometers and Thermometer Controllers.



Brown Area Flow Meters record and totalize Oxygen and acetylene in cutting and welding operations.

Brown Pyrometers record the temperatures in Heating Furnaces.

BROWN INSTRUMENTS



To Measure and Control is to Economize

STILL GOING STRONG ON STEEL!

TRADE ABRASIVE MARK REGISTERED

Lukens Steel Company celebrate their 125th Anniversary—congratulations to them on an historic achievement.

Here is an old company alert to new ideas and methods. High speed grinding is today's answer to the problem of removing excess metal. BOROLON BAKELITE Snagging Wheels are standard because of speed, economy and service.

ABRASIVE COMPANY

DIVISION OF SIMONDS SAW AND STEEL CO.

PHILADELPHIA, PA.

Woolford Wood Tank Co.
Pickling Tank Installation in
LUKENS STEEL COMPANY PLANT

We Felicitate An Old Customer

Since 1854

WOOLFORD

Has Been Synonymous With

WOOD TANKS

•

Steel Treating Tanks being a Specialty

•

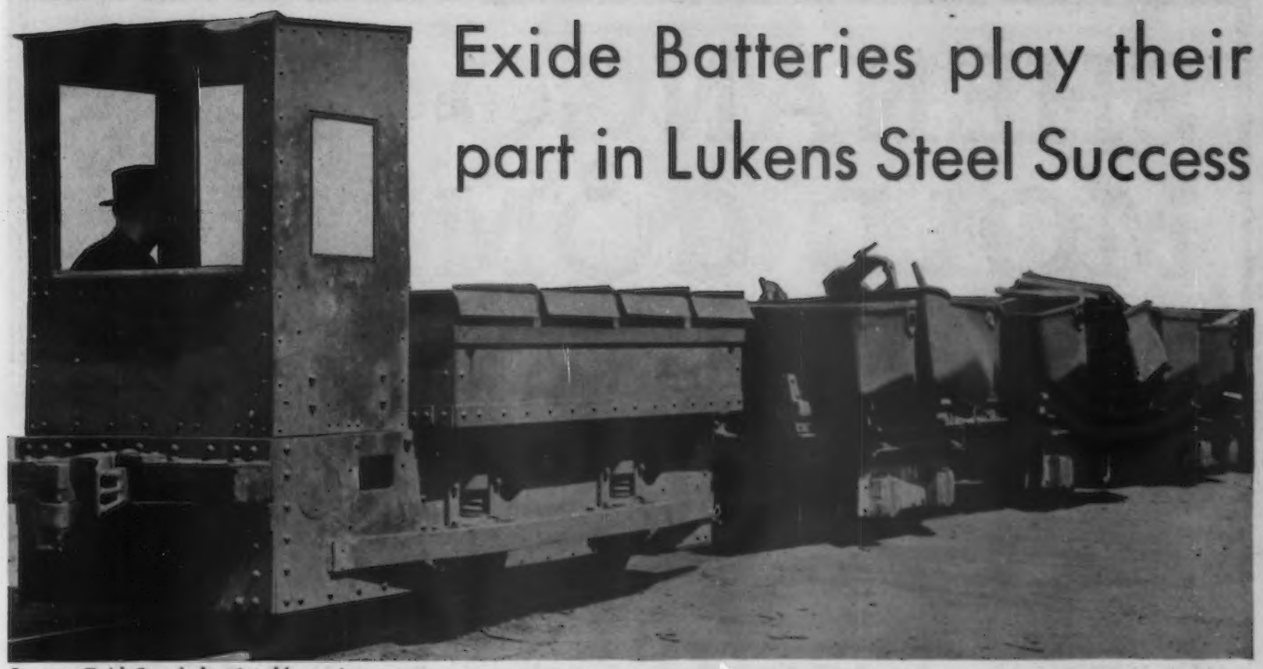
Carefully Selected Lumber—
Advanced Construction
Features Make
WOOLFORD PICKLING TANKS
Dependable

•

G. WOOLFORD WOOD TANK MFG. CO.

PASCHALL P.O., PHILADELPHIA, PA.
***FACTORY*—DARBY, PA.**

Exide Batteries play their part in Lukens Steel Success



Seven-ton Exide-Ironclad equipped locomotive used in Lukens Steel Company plant.

LUKENS Steel Company, oldest in the iron and steel industry, is to be congratulated upon its 125 years of consistent progress. We are proud of the part that Exide Batteries are playing in the continued success of this business. With their dependability, reserve power, long life, and low cost of maintenance, Exides contribute unfailing service and economy in the following important applications:

Exide-Ironclad Batteries propel the Electric Locomotives of Lukens Steel Company and By Products Steel Corporation, division of Lukens Steel Company.

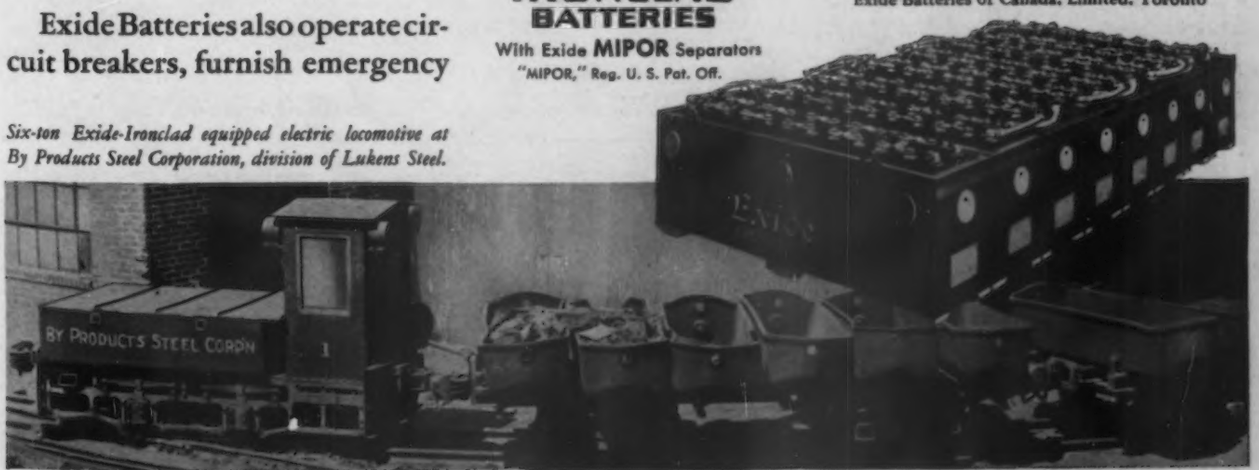
Exide Batteries also operate circuit breakers, furnish emergency lighting protection in the pumping plant, and are used for starting of gasoline locomotives.

It is not by chance that Lukens Steel Company, as well as other leading iron and steel companies, rely on Exide Batteries for important services. They have found that Exides handle their jobs dependably and help to cut production costs throughout their long, trouble-free life. Write for bulletins on storage batteries for electric industrial locomotives and industrial trucks and tractors.

Exide
IRONCLAD
BATTERIES
With Exide **MIPOR** Separators
"MIPOR," Reg. U. S. Pat. Off.

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

Six-ton Exide-Ironclad equipped electric locomotive at By Products Steel Corporation, division of Lukens Steel.



SHENANGO PENN MOLD COMPANY

INGOT MOLDS
○
STOOLS
○
CENTRIFUGALLY CAST BRONZE

Main Office
812 OLIVER BLDG.
PITTSBURGH, PA.

Works
SHARPSVILLE, PA.

Bronze Department
DOVER, OHIO

The PHOENIX IRON CO.

Manufacturers of

STRUCTURAL *and* SHIP SHAPES
TIE PLATES *and* CONTACT RAILS

Executive Offices: 1400 S. Penn Square, PHILADELPHIA, PA.
Works: PHOENIXVILLE, PA.

SALES OFFICES:

30 Church St., New York City
110 State St., Boston, Mass.
Munsey Bldg., Washington, D. C.
100 State St., Albany, N. Y.

SALES AGENTS:

C. E. Naylor, Houston, Texas
Rolph, Mills & Co., San Francisco, Cal.
Frank Pittman, Los Angeles, Cal.
Wm. C. Scott, Jr., Seattle, Wash.
Robert C. Barton, Pittsburgh, Pa.
Track Supply Co., Chicago, Ill.

The PHOENIX BRIDGE CO.

Engineers, Fabricators and Erectors — *Bridges and Other Structures of Steel*

Works and Engineering Office: PHOENIXVILLE, PA.

We felicitate the Lukens Steel Company on their 125th Anniversary.
This year marks our 108th year of pleasant business relations with them.

As One PIONEER *to Another*

In 1855, with the coming of the Bessemer Process, The Iron Age was born and the Lukens Steel Company had already reached its 45th birthday. In the years that followed The Iron Age has been read continuously by the men who made the Lukens Steel Company grow.

Just as this company has pioneered in iron and steel production, so The Iron Age has pioneered in its job of recording, through the years, the development and progress of the great metal-working industry.

Business men who keep abreast of business read business papers. That the Lukens staff has kept abreast—no one would deny. And they themselves will readily admit that a regular reading of The Iron Age helps them to keep abreast.

The Iron Age greets its readers in the Lukens Steel Co., at Coatesville, (listed below) and to them we extend our hearty congratulations.

AT LUKENS STEEL CO.

ROBERT W. WOLCOTT, President
C. L. HUSTON, Vice-President
D. S. WOLCOTT, Vice-President
F. H. GORDON, Vice-President
G. L. GORDON, Gen. Mgr. of Sales
GEORGE THOMAS, 3rd, Treasurer
W. A. HAUCK, Assistant to President
J. F. WIESE, Asst. to Vice-President
E. G. HILL, Director of Research
H. A. OTTEY, Asst. to Gen. Mgr. Sales
W. E. BARNES, Asst. to Vice-President
W. H. BURR, Mechanical & Electrical Supt.
GEORGE CARDWELL, Manager of Alloys
MARTIN CONWAY, Fuel Engineer
STERLING WRIGHT, Mgr. of Sales Schedule
F. M. MANSON, Traffic Manager
L. E. JERVIS, Chief Chemist
J. G. ALTHOUSE, Research Metallurgist
O. TODDERUD, Estimating Department
C. H. BROWN, Manager of Claims
J. D. WALTERS, Supt. of Open Hearths
W. G. HUMPTON, Metallurgical Engineer
T. T. WATSON, Development Metallurgist
L. P. McALLISTER, Asst. Metallurgical Engr.
D. E. McELROY, Sales Engineer
G. K. IRWIN, Safety & Welfare Director
HUGH KENWORTHY, Purchasing Agent
J. H. McELHINNEY, General Superintendent
A. J. O'LEARY, Asst. General Manager Sales
H. J. HOFMANN, Asst. Superintendent O. H.
L. M. CURTISS, Supt. of Plate Mills
R. M. DENNIS, Supt. Flanging Department
P. C. HALDEMAN, Chief Engineer
W. J. BASSETT, Comptroller
G. M. GILLEN, Sales Promotion Manager
P. T. OLDHAM, Manager of Special Sales

AT LUKENWELD, INC.

G. D. SPACKMAN, President
EVERETT CHAPMAN, Vice-President
W. S. WILBRAHAM, Manager of Sales
R. J. WHITING, Shop Superintendent
LLOYD HESS, Chief Engineer
R. C. SAHLIN, Sales Engineer
R. L. BUNTING, Engineer
E. J. CHARLTON, Railway Engineer

AT BY-PRODUCTS STEEL CORPORATION

R. W. MOFFETT, President
C. P. CAMPBELL, Vice-President
H. C. RUDISILL, Supt.

We look forward with LUKENS

OUT of the traditions and experience of 125 years the Lukens Steel Company has built a great business—a business which is serving the needs of the present and looking forward in anticipation to the future.

Welded assemblies are one of the modern developments in which Lukens has pioneered the way.

The illustration shows an electric furnace steel casting which we supplied the Lukenweld Division of Lukens Steel Company for integrating with other steel materials in a modern welded assembly.

As Lukens has pioneered in its field, so Lebanon has pioneered in the production of both normal carbon and alloy steel castings for use by modern industry. We are constantly producing high-strength, corrosion resistant and heat resistant alloy castings for a variety of uses, including welded assemblies.

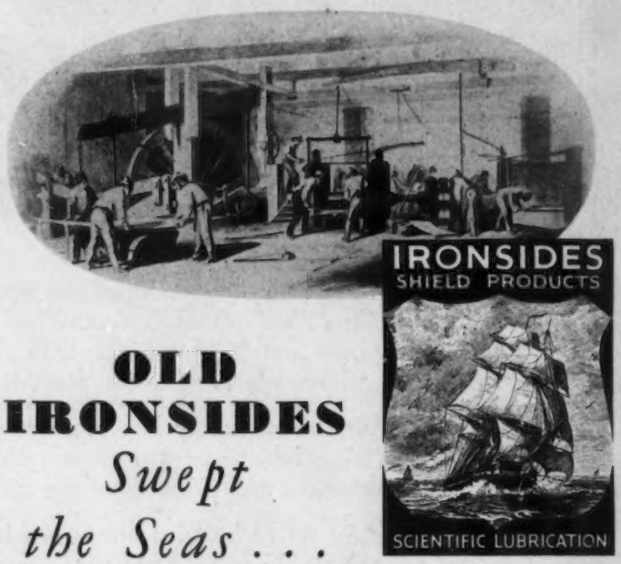
We offer you our experience and our modern facilities.

LEBANON STEEL FOUNDRY

LEBANON, PENNA.

CIRCLE L

When the LUKENS MILL *was young—*



OLD IRONSIDES *Swept the Seas . . .*

THE proud old ship was at length retired. The vigorous young steel company continued to grow and expand with every step of the nation's progress.

Time passed; conditions changed. Towards the end of the century, industry became tremendously accelerated. Products, methods, processes — all assumed new forms. And with them arose many new problems.

Another young company was formed; this time to solve some of the specialized lubrication problems with which industry was meeting. Again the name "Ironsides" became a symbol of integrity.

It is with real pride that The Ironsides Company can now report that it has had the privilege of furnishing Ironsides Shield Products to the Lukens Steel Company, ever since 1899.

We consider that Lukens' continuous patronage for the last thirty-seven years is indeed a testimony of merit for Ironsides Scientific Lubrication.

The

IRONSIDES COMPANY

Scientific Lubrication

COLUMBUS · OHIO · USA

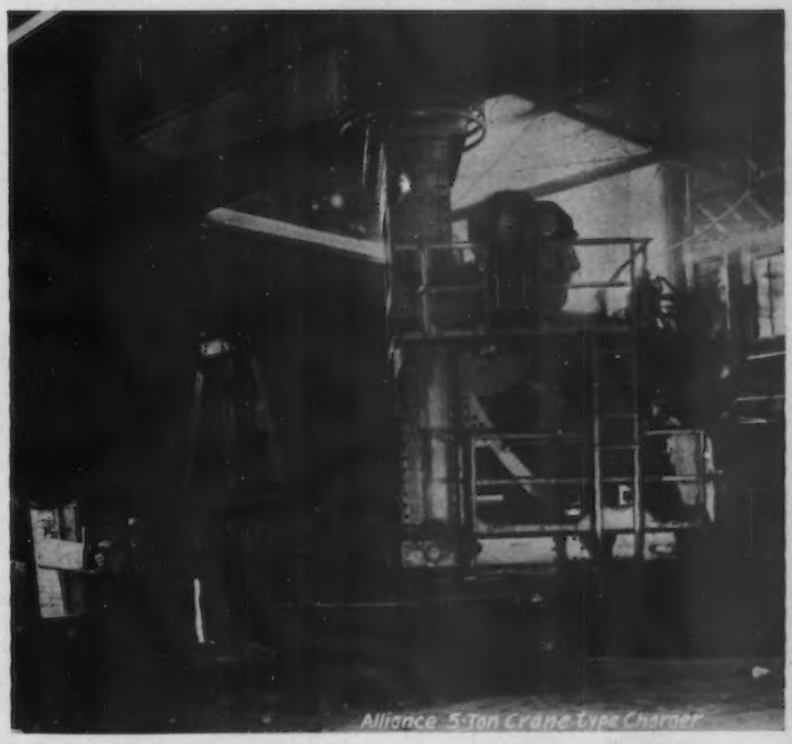
Ehret's 85% Magnesia Insulation used on vessel and piping in Lukens Steel Plant

WE offer our congratulations to Lukens Steel Company for their service to industry throughout the entire Period of American Mechanical development, from the earliest Scientific invention through the present highly Technical era.

EHRET'S 85% MAGNESIA INSULATION

All types of Asbestos Products, Packings and Refractory Cements—helps to decrease maintenance costs and to increase profits through the saving of heat and the minimization of friction.

EHRET MAGNESIA MANUFACTURING COMPANY
VALLEY FORGE, PA.
Branch Offices and Distributors in All Principal Cities



Alliance

Extends its congratulations to the **LUKENS STEEL COMPANY** on this, the one hundred twenty-fifth Anniversary of its founding.

During the past thirty-two years, it has been our pleasure to have furnished many Cranes, both standard and special, to this pioneer company.

THE ALLIANCE MACHINE COMPANY
ALLIANCE, OHIO

Withstanding The Test of Time

This is the second Ohio crane bought by the Lukens Steel Company replacing a former Ohio crane after nearly 20 years of service.

The long life of Ohio cranes is a timely reminder to us to congratulate the Lukens Steel Company in passing its 125th milestone of successful steel-making.

THE OHIO LOCOMOTIVE CRANE CO., Bucyrus, Ohio

Congratulations, Lukens!

On your 125th Anniversary, we are proud of the fact that our products have played their part in your successful and continuous operation.

American Lime & Stone Co.

(Subsidiary of Warner Company)
Founded 1794

PRODUCERS
of
LIMESTONE AND LIME

●

"Bell-Mine" Rotary Kiln Pebble Lime
for WIRE DRAWING

"Bell-Mine" Hydrated Lime
"Bell-Mine" Ground Lime
for WATER PURIFICATION

FLUXING LIME

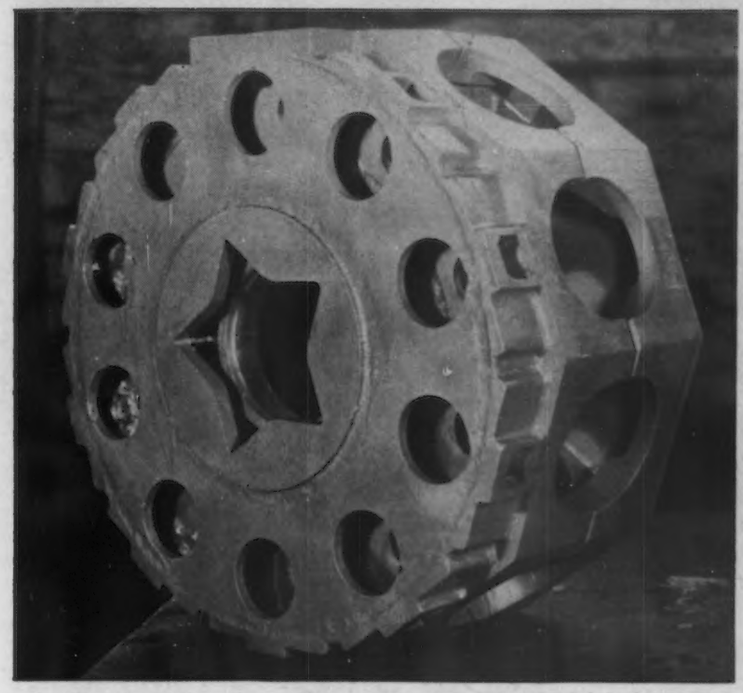
●

PLANT AND EXECUTIVE OFFICES
BELLEFONTE, PA.

SALES OFFICES
PHILADELPHIA NEW YORK PITTSBURGH

Bell-Mine

DODGE CASTINGS IN LUKENWELD CONSTRUCTION



Illustrated at the left is the crankcase for a 10-cylinder two-cycle radial Diesel engine which develops 450 hp. at 900 r.p.m. The engine is the first of its type built in this country and is a product of Continental Motors Corporation of Detroit.

The crankcase was fabricated by arc-welding by the Lukenweld division of Lukens Steel Company. Because of the intricate contours around the cam pockets, Dodge Electric Steel Castings were welded to the steel plate structure to form the periphery of the cam pockets.

Dodge Electric Steel Castings meet the stringent procedure welding requirements of Lukenweld because of the close control over pouring temperatures and analysis, their minimum content of dissolved gases, and their other favorable welding qualities.

Consult Dodge first for better electric steel castings. Dodge Steel Company, Tacony, Philadelphia, Pa.

DODGE ELECTRIC STEEL CASTINGS

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Smart executives

—in metal-working plants see to it that their company subscribes to The Iron Age and then make sure that their names are on the list of readers so that this publication comes to their desk each week.

The Dictaphone Corporation plant is a typical example of how it works. Here is just one of the over 11,800 paid subscribers as shown by the A.B.C. statement, but this one copy has 15 regular readers. They say: "The circulation list for 'Iron Age' in our plant is as follows:—

T. H BEARD, Vice President
J. M. LUCARELLE, General Superintendent
L. D. NORTON, Supervisor of Research
R. E. WORDEN, Purchasing Agent
C. H. MERRITT, Staff Engineer
C. E. ECKLUND, Assistant Superintendent
E. W. CARPENTER, Foreman
R. E. PEAVOY, Foreman
W. BAXTER, Foreman
B. W. DIXON, Foreman
G. W. TRELEASE, Foreman
C. D. GRAY, Foreman
E. G. WHEELER, Time Study
E. J. HAGGERTY, Tool Room
M. R. LUCARELLE, Drafting Room

And one of these readers says: "'Iron Age' is one of the magazines I really read and do not skip through. Of course, much of the data in it is invaluable - - - - in addition to the very instructive articles and editorials, there are general items of interest throughout the magazine that I find particularly attractive."

Smart advertisers who have anything to sell to the metal-working industry tie in with this vast reader audience and constant reader interest.

THE ADVERTISEMENT ON THE OPPOSITE PAGE WAS PREPARED BY McCANN-ERICKSON, INC., NEW YORK, N. Y.

Smart secretaries

nd old fashioned equipment are not compatible!

THE NEW DICTAPHONE
WITH NUPHONIC REPRODUCTIO

Your secretary, too, will enthuse over the amazing naturalness of your voice on this new transcribing instrument.

Given its attractiveness by the industrial designer, Stanford Briggs, and its efficiency by Dictaphone engineers, its Nuphonic* Reproduction is a revelation in voice clarity.

To appreciate that statement it must be seen and heard. Secretaries, the country over, declare it the greatest achievement since the invention of the Dictaphone. Hearing it for the first time, the clear-cut purity of tone seems almost unbelievable.

Ask your secretary to see and hear this new instrument. We can have one on her desk in a few hours after she phones us.

Write or phone for your copy of the Nuphonic Progress Portfolio.

*Nuphonic Reproduction—a new development of the Dictaphone laboratories—gives a new standard of voice clarity such as secretaries have never before experienced.

Dictaphone Sales Corporation
420 Lexington Avenue, New York, N. Y.

☐ I want to see your representative. 1A

☐ Please send me your Nuphonic Progress Portfolio.

Name .....

Company .....

Address .....

DICTAPHONE

"The subject of marketing and advertising, particularly in the industrial field, is such a broad one and has undergone such rapid development in the past few years that only those who devote their efforts exclusively to marketing and advertising can be expected to have an adequate and timely knowledge of the subject and thereby justify the expenditure. To insure maximum return on our advertising appropriation we therefore avail ourselves of the specialized services of an organization which concentrates its efforts on industrial marketing and advertising."

Robert W. Wolcott, President
Lukens Steel Company

All the advertising of Lukens Steel Company is prepared by

G. M. BASFORD COMPANY

19 YEARS OF INDUSTRIAL MARKETING AND ADVERTISING

ESTABLISHED 1916 • MEMBER A. A. A. A.—N. I. A. A.

NEW YORK—60 EAST 42ND STREET

PITTSBURGH—KOPPERS BLDG. • SPRINGFIELD, MASS.—STATE BLDG.

FEDERAL
1308
FEDERAL BEARINGS have long enjoyed an enviable reputation for efficiency . . . precision . . . accuracy. Manufacturers in all industries who seek quality, invariably select FEDERALS.
THE FEDERAL BEARINGS CO., INC.
POUGHKEEPSIE, N. Y.
Makers of Fine Ball Bearings
Detroit Sales Office: 2608 Book Tower
Chicago Sales Office: 120 N. Peoria St.
FEDERAL
BEARINGS

MYSTERY PLANE

Taking off unannounced, the TWA robot-controlled transport air-liner recently set a new mark of 11 hours, 5 minutes, from Los Angeles to New York, clipping ½ hour from the previous transcontinental record.

ULTRA-CUT STEEL

as the "Ace" of fast-cutting screw stocks, shows equally surprising performance in the industrial field. When it is substituted for standard grades of free-cutting steel in fabricating duplicate parts, the speed of automatic screw machines may be stepped up 30% to 40% or more, producing more parts per hour without sacrifice of quality.

The threaded connector, shown at right, was turned out at a rate of 80 pieces per hour with Ultra-Cut versus 55 per hour with SAE 1112. Note also that the count per tool grind was 2200 with Ultra-Cut against 1100 with SAE 1112.

Test B & L Ultra-Cut on your machines, and you will gain a new conception of modern cutting speeds, besides having the satisfaction of beautifully finished products. B & L engineers will welcome the opportunity of cooperating with you in bettering your production. Ask for Ultra-Cut Folder No. 3-A.

- Cold Finished Bars and Shafting
- Ultra-Cut Steel
- Extra Wide Flats
- Special Sections
- Alloy Steels

BLISS & LAUGHLIN, INC.

HARVEY, ILL. *Sales Offices in all Principal Cities* BUFFALO, N.Y.

Electric Arc Welding Bronze Overlays on to Steel

(CONTINUED FROM PAGE 25)

ing-bronze overlays are deposited on to steel by means of the metallic arc process. In this case the bronze is deposited by means of an automatic welding head. The rocker ring is attached to a rotating fixture and made to rotate under the welding head. Fig. 7 shows the welding operation in progress. A suction blower is attached to the fixture to carry away the welding fumes and rotating steel brushes are used to automatically clean each layer before a second layer is deposited.

The success of automatic welding is dependent upon the proper placement and angle of inclination of the wire feeding nozzle and the use of a welding head and welding machine with quick recovery characteristics. The typical manner in which the bronze-electrode melts in large drops makes it essential that the welding circuit be quick to respond so that the arc does not become extinguished. A Westinghouse Weldomatic welding head and 400 amp. Flex Arc welding generator are used for this work.

The overlays on each side of the rocker rings are built up to shape as shown by the dotted lines on Fig. 2 by using four beads. After depositing the bronze, the rings are annealed at 1300 deg. F. for 2 hr. and shot blasted to remove all scale. Following this the bronze overlays and rings are machined to finished dimensions.

Inspection of the bronze overlays made by this method reveal them to be exceptionally sound and free from porosity after machining.

A. S. M. E. Nominates Officers for 1936

NOMINATIONS for officers of The American Society of Mechanical Engineers for 1936 were announced at a meeting of the nominating committee held during the semi-annual meeting of the society at Cincinnati, recently. Election will be held by letter ballot of the entire membership, closing on Sept. 24, 1935. The nominees are as follows:

For president: W. L. Batt, president, SKF Industries, Inc., Philadelphia.

For vice-presidents: A. D. Bailey, superintendent, generating stations, Commonwealth Edison Co., Chicago; J. A. Hunter, professor, University of Colorado, Boulder, Colo.; R. L. Sackett, dean, Pennsylvania State College, State College, Pa., and W. A. Shoudy, Orrok, Myers & Shoudy, New York.

For managers: W. L. Dudley, vice-president, Western Blower Co., Seattle, Wash.; W. C. Lindemann, secretary, A. J. Lindemann & Hoverson Co., Milwaukee, and J. W. Parker, chief engineer, Detroit Edison Co., Detroit.

MODERN ROLL TECHNIQUE

Attention to minute detail governed by years of experience in roll manufacture, has given the products of Pittsburgh Rolls Corporation an enviable position in the steel industry. The standards of roll performance set up by the Pittsburgh Rolls Corporation are regarded by many as standards for the industry.

PHOENIX ROLLS

PHOENIX STEEL, for unusual strength; PHOENIX "A" (steel alloy), for strength and wear; PHOENIX METAL—PHOENIX "K", for strength, wear and finish; PHOENIXLOY (uniformly hard), for flat rolling where high finish of extremely thin gauge of material is required to be free from all marks or defects. Also tube mill rolls of quality material best suited to the kind of service required; PHOENIX CHILL; PHOENIX NICKEL CHILL, for all flat rolling requiring finish.

PITTSBURGH ROLLS CORPORATION

PITTSBURGH, PA.

CAPACITIES: 1 TON TO 450 TONS

Overhead Traveling Crane Types: Floor or Cage Operated with single or twin hook, auxiliary hoist, extension, grab bucket, close clearance, or submerged trolley. Bulletins describing Shepard Niles Cranes and Hoists will be sent to you promptly on receipt of your request.

SHEPARD NILES CRANE & HOIST CORP.
356 Schuyler Avenue, Montour Falls, N. Y.

Activities Bearing on Machine Tool Distribution

° ° °

A Department Conducted by L. M. Waite

° ° °

Demonstration Service

The writer of the machine tool sales letter in the June 20 issue of THE IRON AGE, page 76, evidently struck a responsive chord. There seems to be a wide recognition of existent abuses and desire for their elimination.

A dealer writes: "The presentation of the demonstrator-service situation, in connection with machine tool sales, was timely and the abuse elements were accurately specified. As dealers, we have been too acquiescent with a very expensive, as well as irritating, system which could be drastically curtailed in its liberality."

Another dealer expresses his opinion that many customers, especially among the larger ones, have grown to hope that new equipment delivered to them will not require factory-service; this as against gratuitous service, even though it may be included in the purchase price. He states that, outside of exceptional experiences, his territorial higher-ups are insisting upon prompt acquirement of foreman and operator proficiency in the handling of new equipment.

A purchaser of machine tools writes: "If some estimators of machine production (not all of them, by any means) would base their estimates on proven capabilities and drop the braggadocio system of competitive estimating there would be much less call for long-drawn-out 'prove-it' demonstrations. We are having a second experience along this line now, and hereafter, as far as we are concerned, machines are going to be demonstrated in maker's shops, not in ours."

* * *

The Dead-Line

Concurrent with any necessity for price increases in production equipment, there is generally established a dead-line date after which new prices go into effect. During the past few weeks several of these dead-lines have had dealers and manufacturer representatives on the jump. *Dealers* representing a prominent multiple drill maker report a very satisfactory number of orders on outstanding quotations on which a time-limit was placed, with new prices effective July 15.

A manufacturer's agent advises: "We have had to boost our prices 10 per cent, effective July 22, and I am all tied up with appointments involving a lot of machines and a lot of dollars."

Another manufacturer's representative says: "A surprisingly large number of new inquiries have developed from people who want to get in on the old prices which are out of effect Monday morning. I believe we could load the shop up for a year if we were to take on this new business but we have too much money tied up in new and also in improved design, so there is nothing doing except on outstanding quotations."

* * *

Small Shops

Now that the small shop is placed in a position where financial assistance is available for modernization purposes, a sales manager has notified his crew that stock excuses for lack of sales attention to this class of potential buyers are all "off," at least temporarily. He has supplied territorial lists of small shops on which he has asked his offices for individual reports as to borrowing attitude. While it is quite easy to appreciate a sales position which stresses the amount of time that can be wasted in chasing the infrequent buyer, machine tool salesmen certainly have a new sales-tool in the kit. There are possibilities

TO KEEP THE WHEELS TURNING

TO KEEP the wheels turning requires the best of qualities in both men and motors. We, at Lincoln, accept it as our responsibility to see to it that "Linc-Weld" motors have more than the required horsepower to keep your wheels turning. This extra horsepower, available in every "Linc-Weld" motor, assures you of extra protection against failure.

And the "Linc-Weld" motor is also amply protected against the attacks of dust, dirt and acid fumes. Its waterproof insulation is permanently pliable—will never dry out or crack.

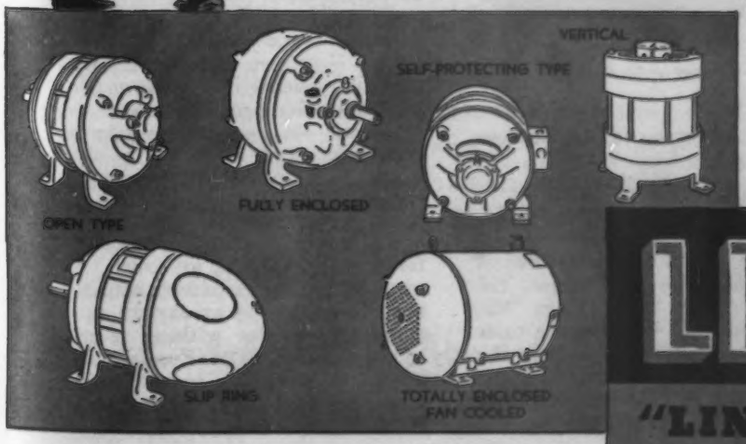
The "Linc-Weld" frame is built of skyscraper construction—rolled steel for greatest strength and rigidity with least bulk. Thus it contains more iron and more copper to give "Linc-Weld" the extra horsepower without sacrifice of power factor or efficiency.

We suggest that if it is responsibility to keep the wheels turning you investigate all the advantages "Linc-Weld" motors can offer you. Write THE LINCOLN ELECTRIC COMPANY, CLEVELAND, OHIO.

M-17

POP "You know, Lad, you never get anything for nothing. Now who pays for the extra overload capacity of the 'Linc-Weld' motors?"

LAD "That is one of the profits of progress, Pop. The 'Linc-Weld' user profits by Lincoln's progress in motor design. As long as you buy old style motors you pay for the losses of lethargy."



LINCOLN

"LINC-WELD" MOTORS

PIG IRON

five established brands

Federal Iroquois Perry

Toledo Zenith

COKE

Foundry, Industrial and Domestic

Chicago Solvay

Milwaukee Solvay

Perry Toledo

Waukegan

Zenith

All Lake Superior grades of

IRON ORE

By-product and Steam

COAL

Pickands, Mather & Co.

Cleveland - Chicago - Detroit - Erie - Toledo

Minneapolis - Duluth

of making this tool of considerable service, although, unquestionably, the borrowing idea will have to be sold to many of the possible machine tool prospects.

* * *

Sales Forces

Three dealers advise of addition to sales forces. One reports a factory-man addition to his organization. Another is sending a man to builder's shops for education; he will take his position on the firing line Sept. 1.

* * *

Earl R. Wilson, well known in the metropolitan machine tool area, has joined the sales force of Triplex Machine Tool Corpn., 125 Barclay Street, New York. Mr. Wilson has had long eastern sales experience, having represented the Foster Machine Co., turret lathe manufacturers, Elkhart, Ind., in his association with the various offices of the Vandyck-Churchill Co. He was later connected with the Jersey City office of Simmons Machine Tool Corpn. of Albany, N. Y.

* * *

Detroit Area

Production equipment buying for new automobile schedules is well under way. There are indications of an extension of this buying activity into other industries, a number of which are said to have released inquiries during the past two weeks.

* * *

East of Buffalo

Several dealers report June as having passed May in volume of business. The metropolitan area has produced a very reasonably satisfactory number of orders; largely for single machines, although one dealer reports two orders for several drill presses each.

* * *

Intertype Corpn., borough of Brooklyn, New York City, is carrying out a modernization program, having purchased office and drafting room equipment in addition to shop equipment. The company's magazine department is having attention in both outside purchases and in the building of special devices engineered within the organization.

* * *

Southern

We learn that the Birmingham territory of the southern area is holding off on machine tool purchases in anticipation of lowered prices as a net result of Supreme Court NRA decision. The position, at least at the moment, does not seem to check with existing trend.

* * *

Pacific Coast

Although there are Pacific Coast lags in the purchase of construction materials, a prominent machine tool dealer writes: "Business and inquiries have picked up with us since the decision of the Supreme Court on the NRA. We have no tendency of waiting to see what is to happen. We are more optimistic out here than we have been before."

* * *

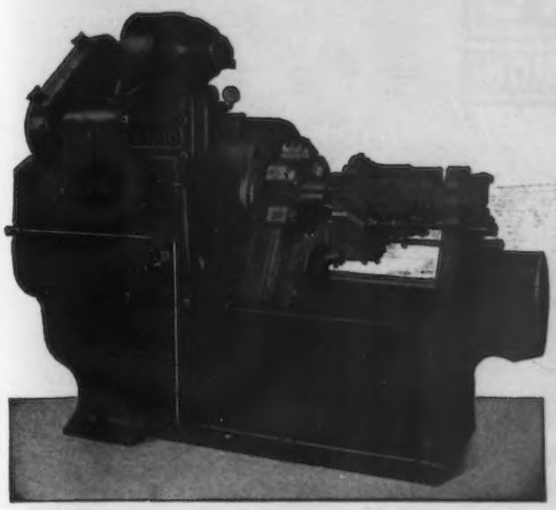
Russia

Additional buying is reported for Russia including an order for some 20 milling machines said to have been taken by an eastern machine tool builder without resort to questionable terms. Russia is reported as agreeable to cash payments but striving for special cash discounts up to 15 per cent.

ACCURACY?

The degree of accuracy to which a machine is built and to which it can be kept, limits its usefulness. To this factor, therefore, BAIRD engineers have paid particular attention.

The turret in the **BAIRD AUTOMATIC MULTIPLE SPINDLE CHUCKING MACHINES AND GRINDERS** is a rigid casting of high tensile strength, partly machined, then heat treated and seasoned, and then bored to within a small fraction of an inch. **This fine degree of accuracy can be maintained** by adjustment or replacement of the Spindle Timkens when and if needed.



Further, the **BAIRD** turrets are lined with a hardened and ground steel lining to turn on a bronze bushing and are locked by the engagement of hardened steel parts in a way that reduces error. Wear is reduced to a minimum, yet take-up for wear is provided.

Thus **"BAIRDS"** are not only built to the finest degree of accuracy so far attained in this class of machine, but **provision is made to keep them accurate.**

Ask BAIRD About It

TURN AROUND JOBS or ALTERNATE CHUCKING

The method of finishing a piece of work from both ends by first passing the work through the machine and performing operations about one end and then turning the work around and gripping by the other end in alternate chucks and passing it through the machine a second time to finish from the other end is **A BAIRD PATENTED FEATURE** and particularly beneficial in **BAIRD MULTIPLE SPINDLE LATHES OR CHUCKING MACHINES** where full advantage may be taken of variable speeds and feeds. This method allows continuous operation on many pieces of work in addition to less handling of work, less time for inspection, less floor space for work, &c. These **BAIRDS** may also be set up **DOUBLE-INDEXING** to take two pieces of work at each cycle of operations.

Ask BAIRD About It

BAIRD AUTOMATIC MULTIPLE SPINDLE INTERNAL GRINDERS. Horizontal as well as Vertical. Built to a fine degree of accuracy.

THE BAIRD MACHINE COMPANY, BRIDGEPORT, CONN.

Use Genuine

LINK-BELT CHAINS

FOR CONVEYING *and* POWER TRANSMISSION

THERE is a correct chain for every conveying, elevating, and power transmission service. As the pioneer manufacturers of chains of this kind, we have developed a type to meet every requirement. Our experienced engineers are prepared to give you unbiased advice on all chain, conveyor, and power transmitting applications. Whether your requirements are small or large—make use of our complete facilities and experience. Send for catalogs.

LINK-BELT COMPANY

Leading Manufacturers of Equipment for Handling Materials Mechanically and Transmitting Power Positively

INDIANAPOLIS - CHICAGO - PHILADELPHIA
SAN FRANCISCO - TORONTO

Offices in Principal Cities 4914-F

A. S. M. E. Holds Large Meeting

MORE than 600 members of the American Society of Mechanical Engineers attended the semi-annual meeting of the society held at the Gibson Hotel, Cincinnati, June 19 to 21.

A comprehensive program was provided. An outstanding event was the presentation of the Alexander Holley medal for 1934 to Dr. Irving Langmuir, General Electric Co., as reported on other pages of this issue. The presentation was made by Ralph E. Flanders, president, Jones & Lamson Machine Co., and president of the A.S.M.E.

A large number of local industrial plants were open for inspection. They included the Baldwin Piano Co., Charles Taylor Sons' Co., Lodge & Shipley Machine Tool Co., American Rolling Mills, Middletown, and the Cincinnati Bickford Tool Co.

The executive committee of the society approved an amendment to the constitution adding two membership classifications; namely, fellow and student. A fellow is defined as one who has had 25 years' experience in the profession and at least 10 years' membership, an exception being made for men who achieve eminence, they being eligible without the time elements. The student member is one who is regularly matriculated in one of the 113 colleges where the society has branches.

Officers for 1936 were nominated, as listed on other pages of this issue.

Steel Comes to Rescue Of Trinity Church

TRINITY CHURCH, historic New York structure on Broadway facing Wall Street, is being reinforced with steel. It is one of the few buildings in lower Manhattan that does not rest on a rock foundation and latterly its spire has shown a tendency to lean toward Wall Street, the present deviation from the vertical at the top being estimated at 1 ft.

In the interest of safety, square steel sheet piling is being placed underneath the foundation of the spire down to rock level for a distance of about 60 ft. The sheet piling is being filled with concrete and will be capped by a platform of structural beams upon which the foundation of the tower will rest. The steel, about 250 tons, is being supplied by the Carnegie Steel Co.

Foreign Dealers

The machine tool exhibition, to be held in Cleveland, Sept. 11-21, will be attended by an unusual number of foreign dealers who handle mechanical equipment. A number of groups will include engineers who plan intensive study, both at Cleveland and at shops, of new equipments which have been announced or are to be given initial presentation at Cleveland. Foreign opinion is said to have reacted very favorably to control mechanisms incorporated both in new and redesigned machines.

* * *

Power

In connection with discussion of relative merit between steam and internal combustion power, it has been recently remarked that Ettore Bugatti, Molsheim, Germany, long a leading authority on and a foremost designer of internal combustion engines, is now devoting his efforts entirely to steam power.

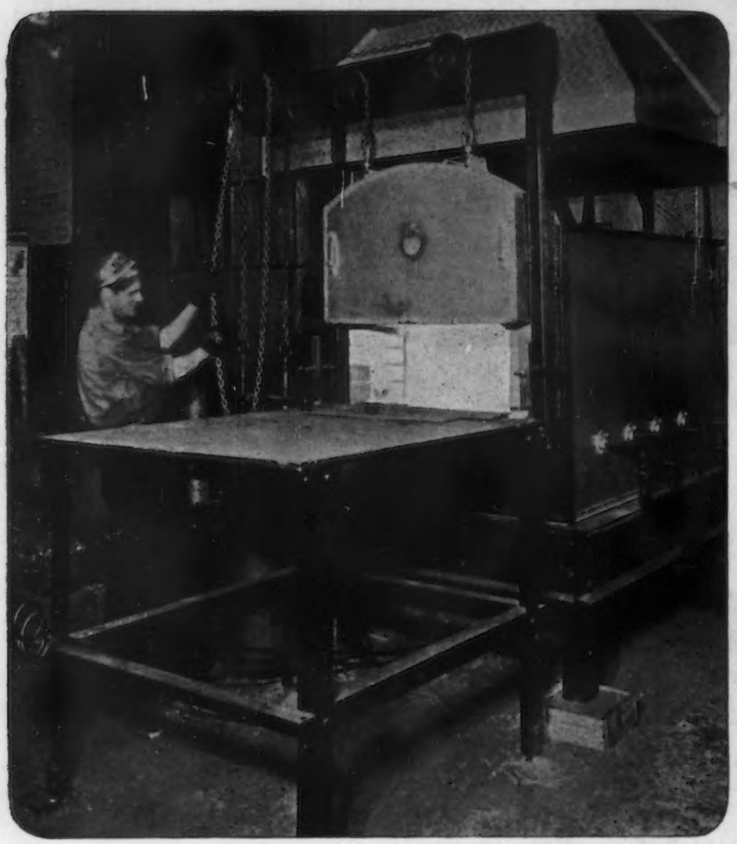
Show your prospects how to give their products longer usefulness in the service of their customers, and the effect will quickly be reflected on your sales-chart.

YOLOY gives you this opportunity. It is an intermediate alloy steel, the accomplishment of years of research and testing. YOLOY possesses not only a higher tensile strength but, in addition, a resistance to both corrosion and abrasion previously attainable only at a higher cost. For complete information, write

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon and Alloy Steels
General Offices . . . YOUNGSTOWN, OHIO

YOLOY

IMPORTANT NEW IMPROVE QUALITY . . .



Carburizing furnace modernized with new light weight refractories

Every industrial executive who is faced with the critical problem of improving quality and at the same time cutting costs of his product, will find it profitable to reappraise his heating processes in the light of the new knowledge of gas developed through recent research.

This research has not only opened up new fields of usefulness for gas in industrial applications, but has pointed the way to production economies and quality improvements which are of special importance today.

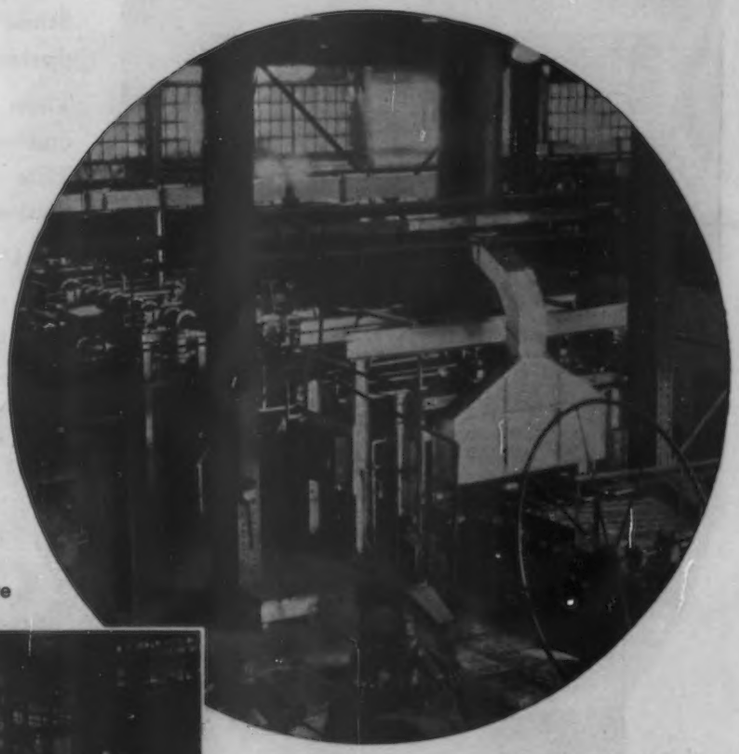
Why not investigate this new knowledge of gas as it may apply to your own problems? In one or

AMERICAN GAS

INDUSTRIAL GAS SECTION . . . 420

RESEARCH POINTS WAY TO LOWER COSTS...WITH GAS

more of the Research Project reports listed at the right, there may be pertinent information which you can use to advantage. Copies of these reports are available, without charge, to interested executives. See your local gas company engineer, or write direct to American Gas Association.



Recently developed walking beam pack heating furnace

Gas-fired furnace with controlled atmosphere for clean hardening

IMPORTANT!

Copies of the following research reports are available to interested executives, WITHOUT CHARGE.

1. The Influence of Atmosphere and Temperature on the Behavior of Steel in Forging Furnaces.
2. The Surface Decarburization of Steel at Heat Treating Temperatures.
3. Baking Practice for Oil—Sand Cores.
4. The Application of Heat To Core Baking.
5. The Effect of Operating Temperatures on the Combustion of Industrial Gas.

   Bulletin No. 1. Study of Combustion Chamber Wall Temperatures.

   Bulletin No. 2. Practical Explanation of Newly Developed Combustion Knowledge.
6. A Study of the Characteristics of Burning Gas With Preheated Air.

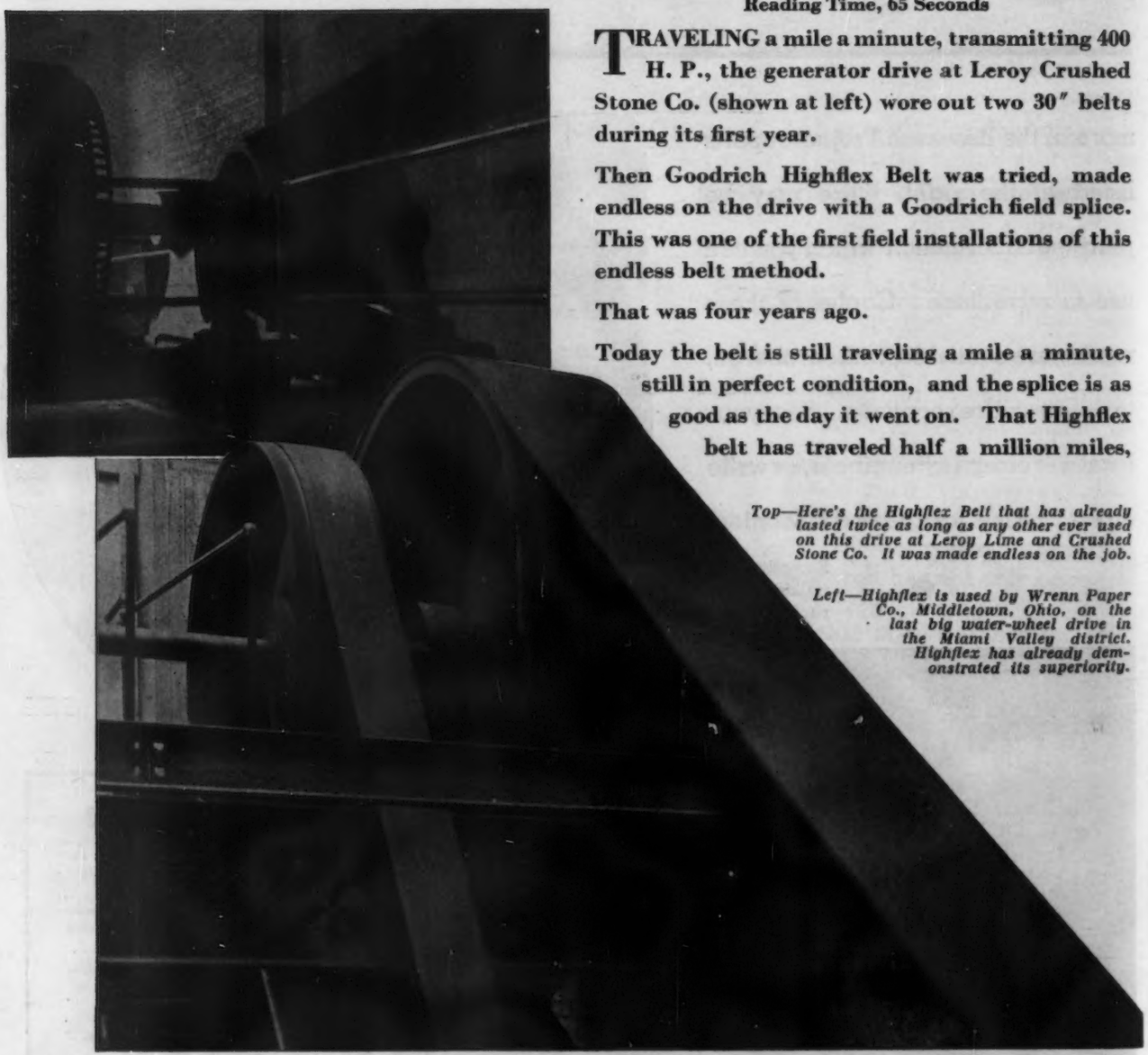
See your local gas company, or write direct to American Gas Association, 420 Lexington Avenue, New York City.

ASSOCIATION

LEXINGTON AVE., NEW YORK CITY

FIELD SPLICE Belt Life 8 Times

Reading Time, 65 Seconds



TRAVELING a mile a minute, transmitting 400 H. P., the generator drive at Leroy Crushed Stone Co. (shown at left) wore out two 30″ belts during its first year.

Then Goodrich Highflex Belt was tried, made endless on the drive with a Goodrich field splice. This was one of the first field installations of this endless belt method.

That was four years ago.

Today the belt is still traveling a mile a minute, still in perfect condition, and the splice is as good as the day it went on. That Highflex belt has traveled half a million miles,

Top—Here's the Highflex Belt that has already lasted twice as long as any other ever used on this drive at Leroy Lime and Crushed Stone Co. It was made endless on the job.

Left—Highflex is used by Wrenn Paper Co., Middletown, Ohio, on the last big water-wheel drive in the Miami Valley district. Highflex has already demonstrated its superiority.

Goodrich

Multiplies This

the splice has flexed over pulleys millions of times, yet neither belt nor splice shows any real wear after these four years of terrific punishment.

Every plant engineer knows the economy and convenience of endless belts, and knows how they reduce down-time. But endless belts have taken weeks to make at the factory or else had a splice which would not hold. Now, with the Plylock Splice, a Highflex Belt can be made endless in the field and it will be as strong as any factory-made endless belt. And with the portable vulcanizer, the job can be done with the belt on the machine, by any mechanic.

No dismantling of the drive, no waiting for factory-made endless belts, no complicated tools necessary. With the Plylock method, endless belts are now practical on any drive with take-up and on many without. Call in your Goodrich Distributor, and save money. The B. F. Goodrich Company, Mechanical Rubber Goods Div., Akron, Ohio.

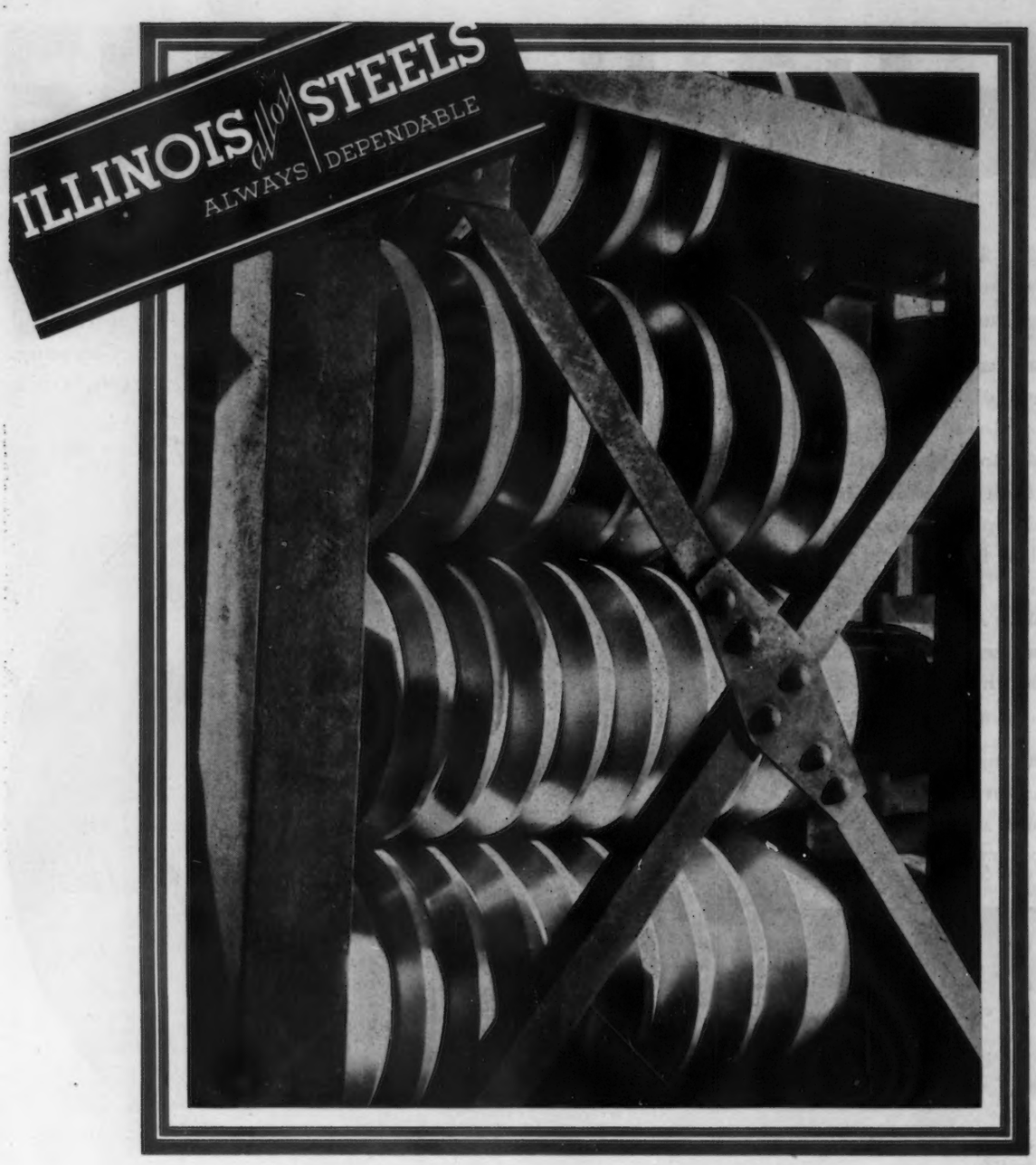
One reason why Goodrich Highflex has become the acknowledged leader in the transmission field is that it maintains tension, requires little or no take-up.

Ply-locking the fabric, one step in making the exclusively Goodrich Plylock Belt Joint.

ALL *products problems* IN RUBBER

Highflex Belting

PLYLOCK BELT JOINT



THE SQUARE IS IN THE ROLL

● Sharp, clean, square edges on alloy bar stock depend on the excellence of the rolls and the proper control of heat and speed in the rolling operations.

The rolls used by Illinois Steel Company in its alloy bar mills are made of the finest and most suitable material, carefully machined and hand-finished. And they're kept in shipshape condition. Whether you order rounds, squares, hexes or other shapes, you'll find your Illinois Alloy bars true to shape, straight as a die, finished to assure perfect surfaces and inspected piece by piece. For uniformity as well as for quality, specify Illinois Alloy Steel.

ILLINOIS STEEL COMPANY

208 SOUTH LA SALLE STREET, CHICAGO, ILLINOIS

United States Steel Corporation Subsidiary

3 GOOD REASONS why seamless tubing is the better basis for Parts

1 MACHINING OPERATIONS ARE MINIMIZED

2 LABOR IS ECONOMIZED

3 WEAR ON TOOLS IS REDUCED

Use NATIONAL-SHELBY Seamless Tubing for making modern-day parts and you will be up-to-the-minute in efficient manufacturing and cost-saving. Just a single cut or light grinding may be all that is needed to make your part, or perhaps simple swaging, expanding, or upsetting, either from hot-finished or cold-drawn tubing. The finished part will be of fine, uniform steel structure with exceptional strength and no excess weight. Available in practically any size and wall-thickness and in various shapes. Grades and treatments of steel are furnished to meet almost any use. Send for Seamless Handbook.

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Pacific Coast Distributors—COLUMBIA STEEL CO., San Francisco, Calif.
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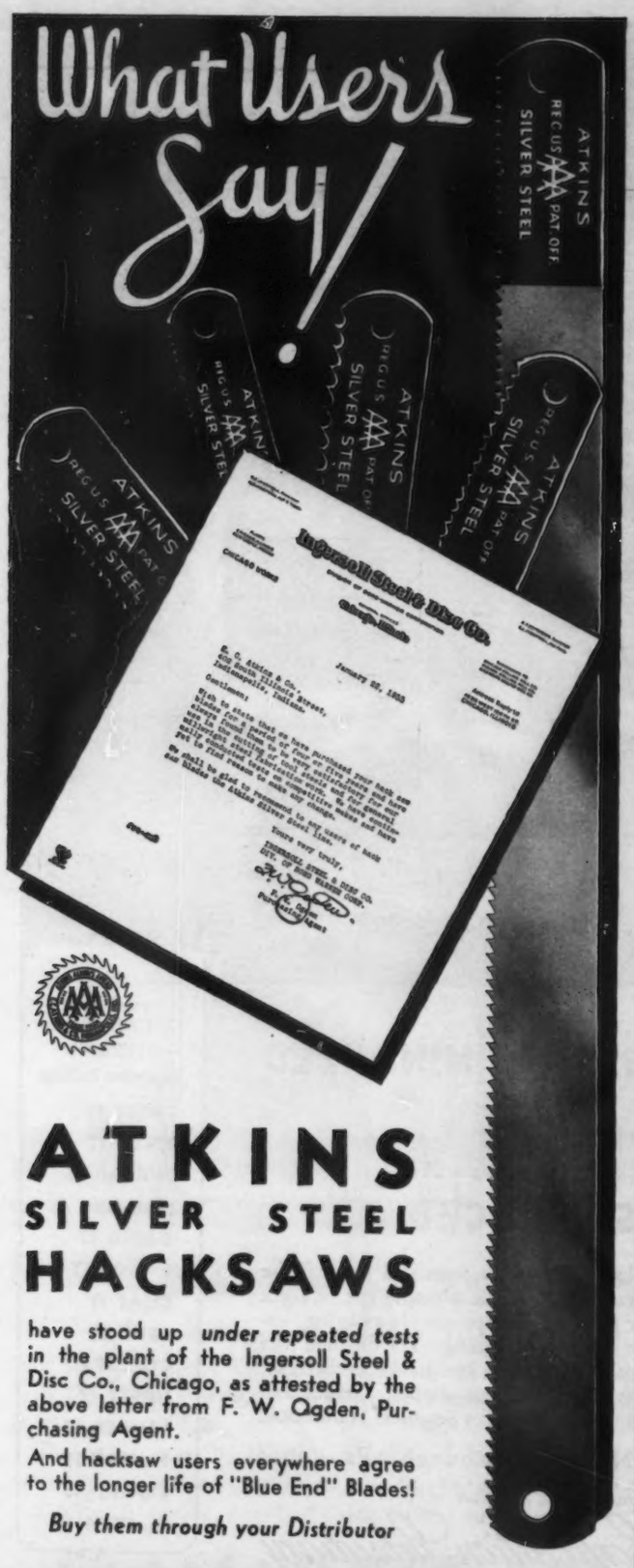
Some things you can do with NATIONAL-SHELBY Seamless Tubing

TWIST IT
WELD IT
THREAD IT
MACHINE IT
GRIND IT
SWAGE IT
COAT IT
BEND IT
COIL IT
UPSET IT
TEMPER IT
FLANGE IT
EXPAND IT
FLATTEN IT

NATIONAL-SHELBY

SEAMLESS MECHANICAL TUBING



ATKINS
SILVER STEEL
HACKSAWS

have stood up *under repeated tests* in the plant of the Ingersoll Steel & Disc Co., Chicago, as attested by the above letter from F. W. Ogden, Purchasing Agent.

And hacksaw users everywhere agree to the longer life of "Blue End" Blades!

Buy them through your Distributor

E. C. ATKINS AND COMPANY
INDIANAPOLIS, INDIANA
BRANCHES:
ATLANTA, GA. CHICAGO, ILL. MEMPHIS, TENN. NEW YORK, N. Y.
NEW ORLEANS, LA. PORTLAND, ORE. SEATTLE, WASH.
KLAMATH FALLS, ORE. SAN FRANCISCO, CALIF. PARIS, FRANCE

JUST BETWEEN US TWO

That Damned Decimal Point

THE eagle eye of I. Maddaus, C. R. Gier Co., New York City, spots this ad on page 146 of the June 20 Iron Age:

> PERMANENT position for experienced man of ability and good character, having $25,000,000 to $50,000,000 to invest in successful hardware and supply business, established 1900. Average sales for past twenty years over $750,000.00. State qualifications and references. If satisfactory will submit details.
>
> ADDRESS BOX K-945
> Care *The Iron Age*, 239 W. 39th St., New York

"Why not," says Mr. Maddaus, "refer Box K-945 to Andy Mellon, Hank Ford, Willie Hearst or J. D., Jr.?"

And what if they didn't write a neat business hand and took a drink now and then?

Bull's Eye

LESS often than dubs score holes in one, do ace advertisements emanate from other than expert hands. And even experts don't deal out aces every day. Everything has to click, and then you get a Mona Lisa, a properly made side car, a Taj Mahal, or a front cover like that Republic Steel advertisement on the June 20 Iron Age.

It's a honey.

"It Was Last Seen in Your Hands"

GIVEN a year on a desert isle and a file of The Iron Age you could concoct a pretty fair economic history of the United States. There would be some gaps, but none important.

As far as the industry itself is concerned the record is virtually complete. For that reason some subscribers bind their copies in volumes, as instance:

> *"We find your paper very interesting and read it every week. We bind these copies at the end of each year and keep them with our permanent records."*

The cost of binding (in buckram) is $3.50 per volume. Six months' copies make one volume. You pay expressage.

But binding can be overdone. If it interferes with full and free movement of copies through the plant, if the reader who tears out a page or clips a coupon is made to feel the biting wrath of a librarian, if a mislaid copy means calling out the guards and locking all doors, then bound volumes do more harm than good.

Trade papers are meant to be circulated freely. Reference files have their uses, but as the time element of most material in trade papers is important, the current reader should not be obliged to defer to occasional referrers. If copies are bound, better get a copy for that purpose only.

He Took His Pen in Hand

ALTHOUGH we cannot, like the Lukens Steel Co., boast of a 125-year existence, we are no youngster. Eighty years have past since John Williams made an actuality of his urge to become a publisher.

Before us lies a copy of his issue of Thursday, Dec. 14, 1865. I. Washburn & Moen advertised crinoline wire. Evidence was offered that steel ships are seaworthy. The chief editorial urged that taxes be assessed to bring in "at least four hundred millions of dollars per year." The editor patted himself on the back as having been first (in 1857) to present the plan of national banking subsequently adopted.

Shoe blacking was much in the public eye. Bixby came right out and said its product was superior to that of Day & Martin, the firm Dickens worked for. Mr. Williams had just obtained an ad from George Jaques & Co., shoe blacking and perfume manufacturers, and remarked editorially that Jaques blacking also was superior to Day & Martin's. Brown Brothers, another blacking manufacturer, also took a crack at Day & Martin. Day & Martin received more advertising free than all the others got at $35 for 12 lines per issue per year "payable in advance."

Three-barreled pistols were in style. Pig iron sold for $54 a ton, copper for 42¢ lb., tin for 46¢ lb. The Universal clothes wringer people printed a glowing testimonial from Rev. Henry Ward Beecher.

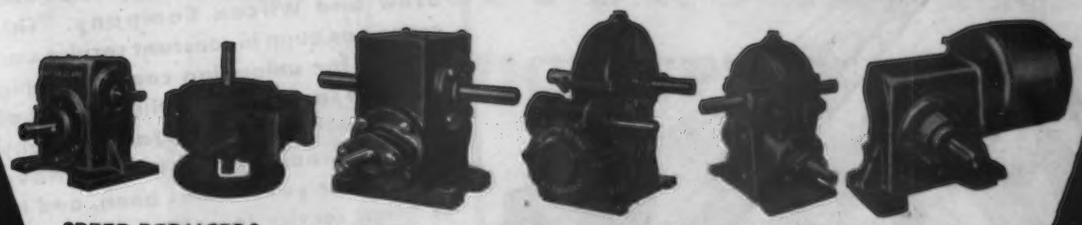
Bouquet

WE have used up our space and practically nothing has been said in praise of The Iron Age. Let it be said by the president of a railroad equipment manufacturing Co.:

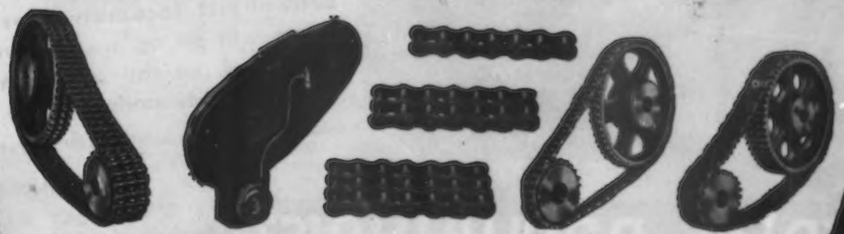
> *"We consider The Iron Age one of the most valuable publications that come to our desk."*

—A. H. D.

GEARS—SPUR, WORM, BEVEL, INTERNAL, MITER, SPIRAL, NON-METALLIC, ETC.



SPEED REDUCERS—HORIZONTAL, VERTICAL, PARALLEL, MOTORIZED, COMPOUND, ETC.



CHAIN DRIVES—ROLLER, SILENT. CHAINCASES, SPROCKETS, ETC.

MISC.—BALL BEARINGS, JOINTS, COUPLINGS, ETC.

COMPLETE STOCKS ALWAYS NEAR YOU!

● **Power transmission products in thousands of *stock* types and sizes, ready for *immediate shipment* at Boston Gear distribution centers from coast to coast.**

Send for Catalog 1A750T containing specifications, prices, and addresses of distribution centers.

BOSTON GEAR WORKS, INC.
North Quincy, Massachusetts, U. S. A.

Direct Factory Branches in Boston, New York, Philadelphia, Cleveland, and Chicago. Sales Offices in Utica, N. Y., Dayton, Ohio, Springfield, Mass., Greensboro, N. C., and Minneapolis, Minn.

BOSTON GEARS

"Of Great Service to Us"

PECK, STOW AND WILCOX

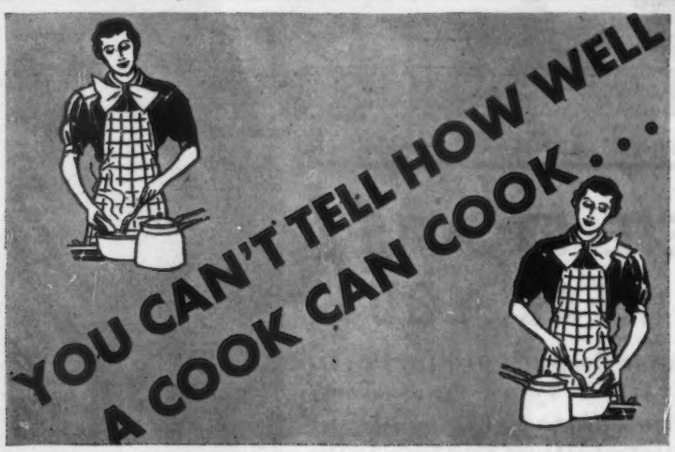
"We have used one of your cranes since November 1918," says The Peck, Stow and Wilcox Company. "This crane has been in constant service and is used for unloading coal, steel, pig iron and sand; also for the loading of cars of scrap and, in fact, for any miscellaneous jobs that we have around our yard. It has been, and is, of great service to us."

May we add that an Industrial Brownhoist locomotive or crawler crane will do as much in your plant yard and, at the same time, effect a remarkable saving.

INDUSTRIAL BROWNHOIST

GENERAL OFFICES:
BAY CITY, MICHIGAN

New York, Philadelphia,
Cleveland, Chicago



UNTIL YOU TRY HER COOKING

You'll admit there's a vast difference in cooks. The only way to compare ability is by **results.** And that's the only way to select cleaners because

THERE'S JUST AS MUCH DIFFERENCE IN CLEANERS

It's purely on the basis of results that Wyandotte Metal Cleaners are so widely used. Wyandotte is uniform itself and produces uniform work. It cleans quickly and thoroughly and maintains its strength in solution over remarkably long periods of time.

It will pay you to investigate the efficiency and economy of Wyandotte Metal Cleaners. One of the Wyandotte Service Representatives will be glad to consult with you on your Metal Cleaning problems.

Wyandotte
Clean "Chemically" Clean
Metal Cleaners

The J. B. Ford Company — Wyandotte, Michigan

WOOD
HYDROLECTRIC
HIGH SPEED PRESSES

1500 ton HydroLectric forming press . . . with hydraulic die cushion. Bed size 48" x 48"

For Forming, Stamping, Drawing, etc.

Designed & built by pioneers in the hydraulic press industry, these presses assure:

Economic Operation

High Production

Better Products

Less Rejects

Uniform Pressure on Work

Quick Die Setting

Long Life of Dies

No breakage of press or dies due to incorrect die setting

Perfect control of speed & pressure

•

They are built with and without hydraulic die cushions and for semi or fully automatic operating cycle.

For additional information refer to

R. D. WOOD CO.

400 Chestnut Street, Philadelphia, Pa.

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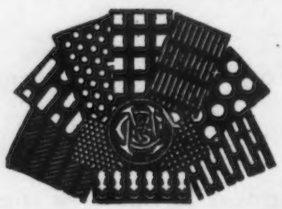
ESTABLISHED
1803

MUNDT
PERFORATED METALS

Large stocks of all metals always in hand ready to punch for any arrangement of perforations.

Sixty-one years of manufacturing perforated metals for every conceivable purpose assures satisfaction.

Write for Catalog of Patterns



TIN, STEEL, COPPER, ALUMINUM, BRONZE, BRASS, ZINC, ANY METAL, ANY PURPOSE

CHARLES MUNDT & SONS
59 FAIRMOUNT AVE., JERSEY CITY, N. J.

Cone 4-Spindle Automatics

Are economical and accurate producers of screw machine parts up to 6" diameter, 7" milling length. They cut costs, increase production, boost profits.

Write for particulars

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REPRESENTATIVES:

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Chicago: John H. Glover, 2127 North Sayre Ave., Chicago, Ill.
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New England: Potter & Johnston Machine Co., Pawtucket, R. I.
Indiana: G. A. Richey, Chamber of Commerce Bldg., Indianapolis, Ind.
New York State: Syracuse Supply Co., Syracuse, N. Y.; also Rochester, N. Y.
Pennsylvania: Arch Machinery Co., 1005 Park Bldg., Pittsburgh, Pa.
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ABRASIVE SURFACE GRINDER

Either Horizontal or Vertical Spindle Type Countershaft or Motor Drive

Get our bulletin for particulars

ABRASIVE MACHINE TOOL CO., East Providence, R. I.

17 STYLES AND SIZES
MERRELL
for BETTER threads
PIPE THREADING MACHINES
TOLEDO, OHIO

HENDRICK
PERFORATED METALS

Perforated Metal Screens in steel, bronze, Stainless Steel, Monel, Aluminum, Everdur and other metals. Perforated Grilles in various metals and many special designs.
Mitco Open Steel Flooring, Mitco Shur-Site Treads, Mitco Armogrids; also elevator buckets, conveyor troughs and products fabricated from heavy plate. Write for catalog.

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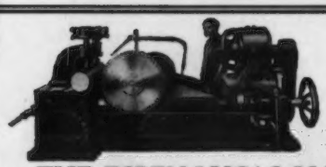


Cutting Off Machines for Sawing All Kinds of Metals

THE ESPEN-LUCAS MACHINE WORKS
FRONT AND GIRARD AVE. PHILADELPHIA, PENNA.

Cutting-Off Machines

—for thin and thick wall steel tubing and bars

BARDONS & OLIVER
Cleveland, Ohio

We also manufacture a large line of turret machinery for finishing cast iron, steel and brass

LELAND-GIFFORD COMPANY

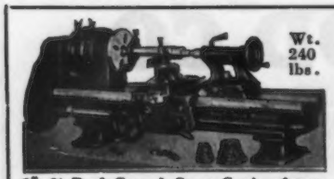
Worcester, Mass.
Drilling Machinery
Belt and Motor Spindle
One to Six Spindles
Tapping Attachments and Multiple Heads

Emery Wheel Dressers

Two Sizes **CUTTERS** Nos. 1-2

We make the regular Huntington (Pattern) for all sizes, Roughing for Nos. 1 and 2. Paragon for No. 1 only.

GEO. H. CALDER CO., Lancaster, Pa., U. S. A.



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9"x3' Back-Geared, Screw Cutting "Workshop" Bench Lathe..... $75

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DAVIS KEYSEATER

This low cost machine will handle keyseating jobs up to 1½ in.

Write for illustrated bulletin.

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Manufacturers of "IDEAL" TROLLEY WHEELS

THE CROSBY COMPANY

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After the first stamping job . . . They come back for more!

Many of our present customers first came to us when they wanted an unusual stamping that called for real experience and ingenuity in the making of it.

Here at Parish they found men accustomed to tackling unusual jobs. These men had at their command a laboratory; a well equipped press department; heat treating equipment. They knew the characteristics of alloy steels intimately, and how to make the dies to work them successfully. They were experienced in design, and in the practical aspects of stamping production.

The experience and ingenuity of these men resulted in the successful production of the unusual stamping at a reasonable price. That's why Parish customers continue to come back for more.

PARISH PRESSED STEEL CO.

READING, PA.

PACIFIC COAST REPRESENTATIVE

F. Somers, Peterson Co., 57 California St., San Francisco, Cal.

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• QUALITY • STAMPINGS

Good Will and Good Work

It is sometimes our good fortune to convert an expense into a saving. Expensive castings are sometimes used when instead they should be stamped and pressed. We have demonstrated the superiority of the stamped piece over the casting in many instances. That was good work. The good will was a natural sequence—so also were the repeat orders.

Perhaps we can also serve you to save. We do anything that can be done in sheet metal work from steel, copper, aluminum and brass.

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Successors to W. & S. Mfg. Co.
Established 1883

Worcester, Massachusetts

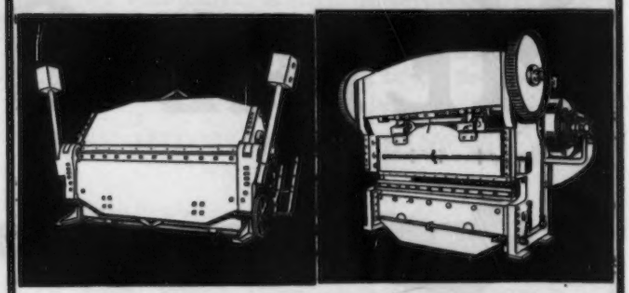
Philadelphia Representative:
H. L. HESS CO., Drexel Bldg.

NO SEPARATE OPERATING VALVE

is required in "HOPKINS" SERIES "C" ROTATING AIR CYLINDERS. Valve is a part of the distributor and requires only a rod connection to lever in convenient position for operator.

THE TOMKINS-JOHNSON COMPANY
628 N. Mechanic St., Jackson, Michigan

CHICAGO STEEL BRAKES —PRESSES—SHEARS



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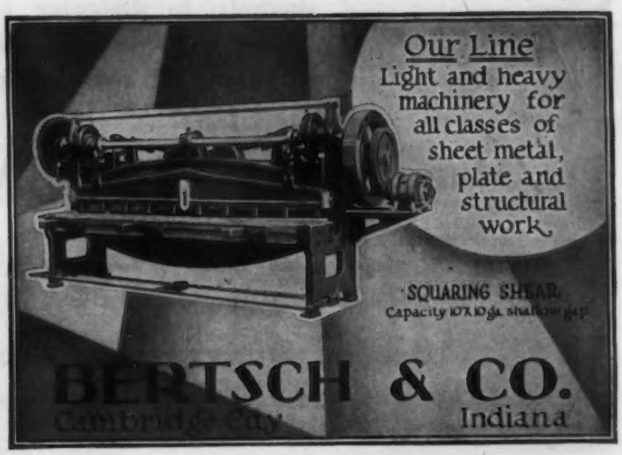
Automatic **MICROMETER**

ROLLING MILL and SHEET METAL GAUGES
Various Types—Sizes
Instant—Accurate—Visible Readings
World Wide Use
HAINES GAUGE CO. 119 S. 4th St., Phila., Pa.

All Metals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Light and heavy machinery for all classes of sheet metal, plate and structural work
SQUARING SHEAR
Capacity 10'X10ga. shallow throat
BERTSCH & CO.
Cambridge City
Indiana

HELWIG'S Patent Bolt and Wire Clippers

Powerful, Sturdy, of Few Parts, Cut with Ease, Close to Work, leaving a Neat Job. Knives cannot wabble. Capacities from ¾" to zero. Also HELWIG Pneumatic and other Hand-operated Time- and Labor-saving Tools having Unique Advantages.

Famous for quality of threads they produce, long life of chasers and all-around dependability.

Following literature available:
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Bulletin on new Insert Chaser Type of Die Head.
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Los Angeles: A. C. Behringer, 312-316 Commercial St., Los Angeles, Cal.
San Francisco: A. H. Coates Company, 1142 Howard St., San Francisco, Cal.

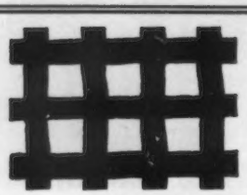
Die Heads

V&O POWER PRESSES
AUTOMATIC FEEDS
AUTOMATIC THREADING MACHINES
THE V & O PRESS CO., HUDSON, N. Y.

THE CLEVELAND STEEL TOOL CO.
Punches. Dies. Chisels. Rivet Sets
660 E. 82nd St. Cleveland, O.
If it's RIVETED you KNOW it's safe

THOMAS
SPACING MACHINE COMPANY
PITTSBURGH
PUNCHING AND SHEARING MACHINERY

QUALITY **SPRINGS** SERVICE
MILLER & VAN WINKLE, INC.
18 BRIDGE ST. BROOKLYN, N. Y.



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ESTABLISHED 1864
EVERYTHING IN WIRE CLOTH
Pioneers in the manufacture of DOUBLE CRIMP WIRE CLOTH and WIRE SCREENING of every kind possible to weave, made of Steel, Iron, Brass, Copper, Bronze, Aluminum, German Silver, Pure Nickel, Galvanized, Tinned, Monel, Manganese, Zinc and Stainless Steel; also Wire Lath, etc.
Also drawers of Brass, Copper, Bronze, German Silver, Pure Nickel, Aluminum, Monel Metal, Wire, etc.
2117 HOWARD STREET, DETROIT, MICH. Write for Catalogue No. 25

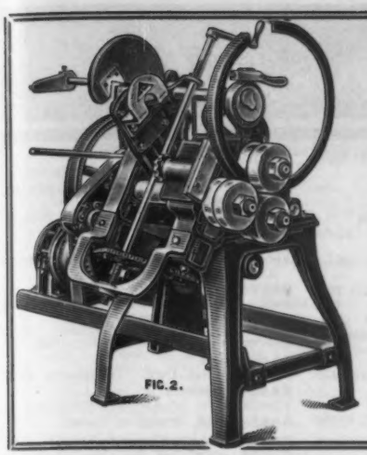
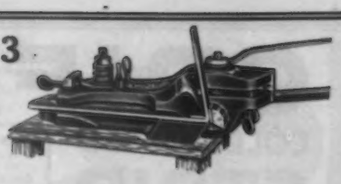


FIG. 2.

No. 14 - EXCELSIOR - No. 13 BENDING MACHINES



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Phosphor Bronze Smelting Co., Phila.
Ryerson, Jos. T., & Son, Inc., Chicago.

BY-PRODUCTS COKE AND GAS OVENS
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General Electric Co., Schenectady, N. Y.

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CADMIUM PLATING PROCESS
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CARBIC
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Shawinigan Prods. Corp., Empire State Bldg., N. Y. C.

CARBIDE—Boron
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CARS—Industrial and Mining
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Bartlett, C.O., & Snow Co., The, Cleveland.

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CASTINGS—Acid or Heat Resisting
Centre Foundry & Mch. Co., Wheeling, W. Va.
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.
Hoskins Mfg. Co., Detroit, Mich.
Lebanon (Pa.) Steel Foundry.
Midvale Co., The, Nicetown, Phila., Pa.

CASTINGS—Alloy Iron
Centre Fdry. & Machine Co., Wheeling, W. Va.
Forging & Casting Corp., The, Ferndale, Mich.

CASTINGS—Alloy Steel
Bissett Steel Co., The, Cleveland.
Dodge Steel Co., Philadelphia.
Lebanon (Pa.) Steel Foundry.
Midvale Co., The, Nicetown, Phila., Pa.

CASTINGS—Aluminum
Aluminum Co. of America, Pittsburgh.
Aluminum Industries, Inc., Cincinnati.

CASTINGS—Brass, Bronze, Copper or Aluminum
Aluminum Industries, Inc., Cincinnati.
Cadman, A. W., Mfg. Co., Pittsburgh.
Pennsylvania Bronze Foundry, Harrisburg, Pa.
Phosphor Bronze Smelting Co., Phila.
Snyder, W. P., & Co., Pittsburgh.
Spencer's, I. S., Sons, Inc., Guilford, Ct.

CASTINGS—Corrosion Resisting
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Centre Fdry. & Machine Co., Wheeling, W. Va.
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North Wales (Pa.)) Mach. Co., Inc.
Spencer's, I. S., Sons, Inc., Guilford, Ct.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

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Peoria (Ill.) Malleable Castings Co.

CASTINGS—Semi-Steel
Malleable Iron Fittings Co., Branford, Ct.

CASTINGS—Semi-Steel Alloy
Centre Fdry. & Machine Co., Wheeling, W. Va.
Forest City Foundries Co., The, Cleveland.

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Birdsboro (Pa.) Steel Fdry. & Mch. Co
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CEMENT—Quick Setting, Acid Proof and Insulator
Nukem Products Corp., 68 Niagara St., Buffalo.

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Ehret Magnesia Mfg. Co., Valley Forge, Pa.
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Harbison-Walker Refractories Co., Pitgh.
Massillon (Ohio) Refractories Co.
Swank's, Hiram, Sons, Inc., Johnstown, Pa.

CEMENT—Rubber
Goodrich, B. F., Co., Akron, Ohio.

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Baldwin-Duckworth Chain Corp., Springfield, Mass.
Bartlett, C. O., & Snow Co., The, Cleveland.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Link-Belt Co., Chicago.

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Boston Gear Works, Inc., North Quincy, Mass.
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Whitney Mfg. Co., Hartford, Conn.

CHAINS—Silent
Link-Belt Co., Chicago.
Whitney Mfg. Co., Hartford, Conn.

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Alrose Chemical Co., Providence, R. I.
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.
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CHROMIUM METAL
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

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Magnetic Mfg. Co., 626 South 28th St., Milwaukee.

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LUBRICANTS—Mine Cars
Gulf Refining Co., Pittsburgh.
Sinclair Refining Co., Inc., 45 Nassau St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Co., The, 135 East 42nd St., N. Y. C.
Tide Water Oil Co., 17 Battery Place, N. Y. C.
LUBRICANTS—Mining Machines
Gulf Refining Co., Pittsburgh.
Sinclair Refining Co., Inc., 45 Nassau St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Co., The, 135 East 42nd St., N. Y. C.
Tide Water Oil Co., 17 Battery Place, N. Y. C.
LUBRICANTS—Railroad
Columbia Refining Co. of New York, 44th Ave. & 23rd St., Long Island City, N. Y.
Gulf Refining Co., Pittsburgh.
Ironsides Co., The, Columbus, Ohio.
Sinclair Refining Co., Inc., 45 Nassau St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Co., The, 135 East 42nd St., N. Y. C.
Tide Water Oil Co., 17 Battery Place, N. Y. C.
LUBRICANTS—Roll Neck—Anti-Friction & Plain
Columbia Refining Co. of New York, 44th Ave. & 23rd St., Long Island City, N. Y.
Gulf Refining Co., Pittsburgh.
Ironsides Co., The, Columbus, Ohio.
Sinclair Refining Co., Inc., 45 Nassau St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Co., The, 135 East 42nd St., N. Y. C.
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LUBRICANTS—Tipple & Cleaning
Gulf Refining Co., Pittsburgh.
Sinclair Refining Co., Inc., 45 Nassau St., N. Y. C.
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Sun Oil Co., Philadelphia.
Texas Co., The, 135 East 42nd St., N. Y. C.
Tide Water Oil Co., 17 Battery Place, N. Y. C.
LUBRICATING SYSTEMS—Automatic
Trabon Engineering Corp., Cleveland.
LUBRICATORS
Trabon Engineering Corp., Cleveland.
MACHINE GUARD MATERIALS
Erdle Perforating Co., Rochester, N. Y.
MACHINE WORK
Currie, J. B., & Son, 70-72 Adams St., Brooklyn, N. Y.
General Machine Works, York, Pa.
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Cincinnati (Ohio) Mchr. & Supply Co.
Crawford, F. H., & Co., Inc., 50 Church St., N. Y. C.
Donahue Steel Prods. Co., 1609 W. 74th St., Chicago.
Eastern Mchry. Co., 3263 Spring Grove Ave., Cincinnati, O.
Emerman, Louis E., & Co., Chicago.
Falk Mill Supply Co., Inc., Rochester, N. Y.
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
Industrial Plants Corp., 90 West Broadway, N. Y. C.
Iroquois Mchry. Co., 656 Ohio St., Buffalo, N. Y.
Lucas, J. L., & Son, Inc., Bridgeport, Conn.
Machinery Dealers, Inc., New Haven, Ct.
Marr-Galbreath Mchry. Co., Pittsburgh.
Midland Steel & Equipment Co., Chicago.
Miles Mchry. Co., Saginaw, W. S., Mich.
Morey Mchry. Co., Inc., 410 Broome St., N. Y. C.
Moyer, J. N., Philadelphia.
O'Brien Machinery Co., Philadelphia.
Ritterbush & Co., Inc., 30 Church St., N. Y. C.
Riverside Mchry. Depot, Detroit.
Ryerson, Joseph T., & Son, Inc., Chicago.
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Simmons Mch. Tool Corp., Albany, N. Y.
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White, A. D., Mchry. Co., Chicago.
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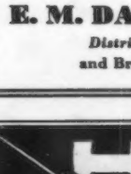

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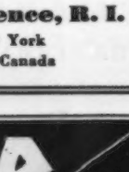

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MAGNETS—Lifting
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MALLETS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

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Worcester (Mass.) Stamped Metal Co.

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Haines Gauge Co., The, Phila., Pa.

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Emerman, Louis E., & Co., Chicago.
Industrial Mchry. Corp., Indianapolis.
RCA Mfg. Co., Inc., Camden, N. J.

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Parker-Kalon Corp., 196 Varick St., N. Y. C.

OIL & GREASE SEALS
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

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OILS—Cutting
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Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
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Tide Water Oil Co., 17 Battery Place, N. Y. C.

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Pickands Mather & Co., Cleveland.
Shenango Furnace Co., Pittsburgh.
Snyder, W. P., & Co., Pittsburgh.

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OVENS—Core and Mold
Holcroft & Co., Detroit.
Mahr Mfg. Co., Minneapolis, Minn.

OVENS—Cross Regenerative
Koppers Construction Co., The, Pittsburgh.

OVENS—Enameling and Japanning
Carborundum Co., The, Perth Amboy, N. J.
Mahr Mfg. Co., Minneapolis, Minn.

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Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

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Booth Felt Co., Inc., 435—18th St., Brooklyn, N. Y.

PACKING—Hydraulic
Schieren, Chas. A., Co., 30 Ferry St., N. Y. C.

PACKING—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Graton & Knight Co., Worcester, Mass.
Schieren, Chas. A., Co., 30 Ferry St., N. Y. C.

PACKING—Metallic
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PACKING—Rubber
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PACKING—Sheet, Asbestos or Rubber
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Sherwin-Williams Co., Cleveland.

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Erdle Perforating Co., Rochester, N. Y.
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Albert Pipe Supply Co., Inc., Berry and N. 13th St., Brklyn., N. Y.
Fisher Bros. Steel Corp., Morris Ave. & 139th St., Bronx.
Green Point Iron & Pipe Co., Inc., 187-197 Maspeth Ave., Bklyn., N. Y.

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PLANTS FOR SALE
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PLASTICS—Moulded
Bakelite Corp., 247 Park Ave., N. Y. C.

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PRESSES—Coining
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Oilgear Co., The, 1311 W. Bruce, Milwaukee.
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PRESSES—Power
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Farrel-Birmingham Co., Inc., Ansonia, Conn.
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Erie (Pa.) Foundry Co.

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Magnetic Mfg. Co., 626 South 28th St., Milwaukee.

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Fairbanks, Morse & Co., Chicago.

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Fairbanks, Morse & Co., Chicago.
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Fairbanks, Morse & Co., Chicago.

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Fairbanks, Morse & Co., Chicago.
Vickers, Inc., 1420 Oakman Blvd., Detroit.
Worthington Pump & Mchry. Corp., Harrison, New Jersey.

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Fairbanks, Morse & Co., Chicago.
Worthington Pump & Mchry. Corp., Harrison, New Jersey.

PUMPS—Rotary
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PUMPS—Steam
Fairbanks, Morse & Co., Chicago.
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Ryerson, Jos. T., & Son, Inc., Chicago.
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Thomas Spacing Mach. Co., Pittsburgh.

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Brown Instrument Co., The, Phila.
Hoskins Mfg. Co., Detroit, Mich.

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REAMERS
Cleveland (Ohio) Twist Drill Co., The.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Hartford, Conn.
REFRACTORIES
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.
Cleveland (Ohio) Quarries Co., The.
General Refractories Co., Phila.
Harbison-Walker Refractories Co., Ptgh.
Illinois Clay Products Co., Joliet, Ill.
Massillon (Ohio) Refractories Co.
Osceola Silica & Fire Brick Co., Osceola Mills, Pa.
Swank's, Hiram, Sons, Inc., Johnstown, Pa.
Valentine, M. D., & Bro. Co., Woodbridge, N. J.
REGULATORS—Compressed Gas
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.
REINFORCEMENT FABRIC—Concrete
Pittsburgh (Pa.) Steel Co.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.
RINGS—Iron or Steel
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RINGS—Welded
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RIVET MAKING MACHINERY
Acme Machinery Co., Cleveland.
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Cleveland Steel Tool Co., The, 660 E. 82d St., Cleveland, Ohio.
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Hassall, John, Inc., Clay & Oakland Sts., Bklyn, N. Y.
Oliver Iron & Steel Corp., Pittsburgh.
Progressive Mfg. Co., Torrington, Conn.
Ryerson, Jos. T., & Son, Inc., Chicago.
RODS—Aluminum
Aluminum Co. of America, Pittsburgh.
RODS—Brass
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Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
RODS—Magnesium Alloys
Dow Chemical Co., 921 Jefferson Ave., Midland, Mich.
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Seymour (Conn.) Mfg. Co.
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Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Riverside (N. J.) Metal Co.
Ryerson, Jos. T., & Son, Inc., Chicago.
Seymour (Conn.) Mfg. Co.
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Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
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Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
RODS—Wire
American Steel & Wire Co., Chicago.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Wickwire Brothers, Cortland, N. Y.
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ROLLING MACHINERY—Cold Rolling
Lewis Foundry & Mch. Co., Pittsburgh.
United Engineering & Fdry. Co., Ptgh.
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Lewis Foundry & Mch. Co., Pittsburgh.
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Birdsboro (Pa.) Steel Fdry. & Mch. Co.
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Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hyde Park (Pa.) Fdry. & Mch. Co.
Lewis Foundry & Mch. Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., The, Alliance, Ohio.
National Roll & Fdry. Co., Avonmore, Pa.
United Engineering & Fdry. Co., Ptgh.
Waterbury (Ct.) Farrel Fdry. & Mch. Co.
ROLLS—Alloy Steel
Pittsburgh (Pa.)) Rolls Corp.
ROLLS—Bending and Straightening
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Bertsch & Co., Cambridge City, Ind.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
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Birdsboro (Pa.) Steel Fdry. & Mch. Co.
Hyde Park (Pa.) Fdry. & Mach. Co.
Lewis Foundry & Mch. Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
National Roll & Fdry. Co., Avonmore, Pa.
Pittsburgh (Pa.) Rolls Corp.
United Engineering & Fdry. Co., Ptgh.
ROLLS—Special Hardened
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ROOFING—Special Copper Bearing Steel
Newport (Ky.) Rolling Mill Co., The.
Superior Sheet Steel Co., Canton, Ohio.
ROOFING AND SIDING—Corrugated and Plain
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American Sheet & Tin Plate Co., Ptgh.
Newport (Ky.) Rolling Mill Co., The.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.
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Newport (Ky.) Rolling Mill Co.
Superior Sheet Steel Co., Canton, Ohio.
ROOFING AND SIDING—Iron and Steel
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American Hard Rubber Co., 11 Mercer St., N. Y. C.
Goodrich, B. F., Co., Akron, Ohio.
RUBBER MOLDED PARTS
American Hard Rubber Co., 11 Mercer St., N. Y. C.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
RUST PREVENTIVES
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corp., Lawrence, Mass.
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.
RUST PROOFING COMPOUNDS
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.
RUST PROOFING PROCESS
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.
Udylite Co., The, Detroit.
RUST REMOVING
American Chemical Paint Co., Ambler, Pa.
Nukem Products Corp., 68 Niagara St., Buffalo.
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American Foundry Equipment Co., Mishawaka, Ind.
Arcade Mfg. Co., Freeport, Ill.
Panghorn Corporation, Hagerstown, Md.
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American Foundry Equipment Co., Mishawaka, Ind.
Pittsburgh (Pa.) Crushed Steel Co.
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Bartlett, C. O., & Snow Co., The, Cleveland.
Jeffrey Mfg. Co., The, Columbus, Ohio.
SAWING MACHINES—Metal
Espen-Lucas Mch. Works, Phila.
SAWS—Band and Hack for Metal
Armstrong-Blum Mfg. Co., Chicago.
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.
Wells Mfg. Co., Three Rivers, Mich.
SAWS—Circular, Rip & Cutoff
Atkins, E. C., & Co., Indianapolis.
SAWS—Friction
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.
SAWS—Hack Saw Blades
Atkins, E. C., & Co., Indianapolis.
SAWS—Hot Metal
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.
SAWS—Inserted Tooth, Cold
Disston, Henry, & Sons, Inc., Philadelphia.
Tabor Mfg. Co., Philadelphia.
SAWS—Milling
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.
SCREENS—Perforated Metal
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chi.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.
SCREENS—Woven Wire
Michigan Wire Cloth Co., 2117 Howard St., Detroit.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.
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Barnes, Wallace, Co., The, Bristol, Conn.
Blake & Johnson Co., The, Waterville, Ct.
Cleveland (Ohio) Cap Screw Co., The.
Commonwealth Brass Corp., Detroit.
Eastern Mch. Screw Corp., New Haven, Conn.
Olson Mfg. Co., Worcester, Mass.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Progressive Mfg. Co., Torrington, Conn.
Screw Mch. Products Corp., Prov., R. I.
Weatherhead Co, The, Cleveland
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SCREW MACHINERY—Hand
Jones & Lamson Mch. Co., Springfield, Vt.
SCREW MACHINERY—Multiple Spindle
Cone Automatic Mach. Co., Inc., Windsor, Vt.
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SCREWS—Cap
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Cleveland (Ohio) Cap Screw Co., The.
Ottemiller Wm. H., Co., Inc., York, Pa.
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Cleveland (Ohio) Cap Screw Co., The.
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Blake & Johnson Co., The, Waterville, Ct.
Progressive Mfg. Co., The, Hartford, Conn.

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Bristol Co., The, Waterbury, Conn.
Progressive Mfg. Co., The, Hartford, Conn.
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Set
Bristol Co., The, Waterbury, Conn.
Ottemiller, Wm. H., Co., Inc., York, Pa.

SCREWS, Socket, Head, Cap
Bristol Co., The, Waterbury, Conn.
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Thumb
Parker-Kalon Corp., 196 Varick St., N. Y. C.

SCRUBBING MACHINES—Sheet
Wean Engineering Co., Inc., The, Warren, Ohio.

SCYTHE STONES AND WHETSTONES
Carborundum Co., The, Niagara Falls, N. Y.

SECOND-HAND MACHINERY—See Clearing House Section
American Air Compressor Corp., 562 Hamilton Ave., Brooklyn, N. Y.
Berndt, A. J., Co., Union City, N. J.
Botwinik Brothers, Inc., New Haven, Conn.
Cincinnati (Ohio) Mchry. & Supply Co.
Denny, W. L., Chicago.
Donahue Steel Prods. Co., 1609 W. 74th St., Chicago.
Eastern Machinery Co., 3263 Spring Grove Ave., Cincinnati, Ohio.
Essley E. L., Mchry. Co., Chicago.
Equitable Equipment Co., New Orleans, La.
Falk Mill Supply Co., Inc., Rochester.
Foster, Frank B., 829 Oliver Bldg., Pgh.
General Electric Co., Erie, Pa.
Hendry, R. L., 1506 Santa Fe Ave., Los Angeles, Calif.
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
Industrial Mchry. Corp., Indianapolis.
Industrial Plants Corp., 90 West Broadway, N. Y. C.
Industrial Trading Corp., 227 Fulton St., N. Y. C.
Iron & Steel Products, Inc., Chicago.
Iroquois Mchry. Co., 656 Ohio St., Buffalo, N. Y.
Knox, Earl E., Co., Erie, Pa.
Lucas, J. L., & Son, Inc., Bridgeport, Conn.
McKey, Frank M., Trustee, Grigsby-Grunow Co., Inc., 5801 Dickens Ave., Chicago.
Machinery Dealers, Inc., New Haven, Conn.
Marr-Galbreath Mchry. Co., Pittsburgh.
Midland Steel & Equip. Co., Chicago.
Miles Mchry. Co., Saginaw, W. S. Mich.
Mullin, Colman J., 50 Church St., N. Y. C.
O'Brien Machinery Co., Philadelphia.
Oviatt, D. C., & Co., Cleveland.
RCA Mfg. Co., Inc., Camden, N. J.
Ritterbush & Co., Inc., 30 Church St., N. Y. C.
Riverside Mchry. Depot, Detroit.
Rosenkranz & Welsbecker, 149 Broadway, N. Y. C.
Ross Power Equip. Co., Indianapolis, Ind.
Safe Harbor Water Power Corp., Conestoga, Pa.
Scully-Jones & Co., Chicago.
Simmons Mch. Tool Corp., Albany, N. Y.
Stanhope, R. C., Inc., 101 W. 31st St., N. Y. C.
Sun Mchry. Co., Inc., Newark, N. J.
Sutton Eng. Co., Pittsburgh, Pa.
West, W. F., Detroit.
White, A. D., Mchry. Co., Chicago.
Wigglesworth Mchry Co., Cambridge, Mass.

SEPARATORS—Magnetic
Dings Magnetic Separator Co., Milwaukee.
Magnetic Mfg. Co., 626 South 28th St., Milwaukee.

SHAFTING—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SHAFTING—Steel
Union Drawn Steel Co., Massillon, Ohio.

SHAFTING—Turned and Ground
Bliss & Laughlin, Inc., Harvey, Ill.
Moltrup Steel Prods. Co., Beaver Falls, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SHAPERS
Cincinnati (Ohio) Shaper Co.

SHAPERS—Vertical
Pratt & Whitney Co., Hartford, Conn.

SHAPES—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SHAPES—Wire
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Roebling's, John A., Sons Co., Trenton, N. J.

SHEAR BLADES & KNIVES
Hoppenstall Co., Pittsburgh.
Quickwork Co., The, St. Marys, Ohio.

SHEARING MACHINES—Alligator
Canton (Ohio) Fdry. & Mch. Co.

SHEARING MACHINES—Angle, Hand and Power
Buffalo (N. Y.) Forge Co., 492 Broadway.
Federal Bearings Co., Inc., Poughkeepsie, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

SHEARING MACHINES—Bar
Buffalo (N. Y.) Forge Co., 492 Broadway.
Schatz Mfg. Co., The, Poughkeepsie, N.Y.
United Engineering & Fdry. Co., Pgh.

SHEARING MACHINES — Beam and Channel
Buffalo (N. Y.) Forge Co., 492 Broadway.
Schatz Mfg. Co., The, Poughkeepsie, N.Y.
United Engineering & Fdry. Co., Pgh.

SHEARING MACHINES—Billet
Buffalo (N. Y.) Forge Co., 492 Broadway.
Morgan Engineering Co., The, Alliance, Ohio.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pgh.

SHEARING MACHINES—Metal Slitting
Quickwork Co., The, St. Marys, Ohio.

SHEARING MACHINES, Plate
Bertsch & Co., Cambridge City, Ind.
Buffalo (N. Y.) Forge Co., 492 Broadway.
Cincinnati (Ohio) Shaper Co.
Dreis & Krump Mfg. Co., Chicago.
Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., The, Alliance, Ohio.
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Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Pgh.

SHEARING MACHINES—Rotary, for Irregular Cutting
Quickwork Co., The, St. Marys, Ohio.

SHEARING MACHINES — Sheet and Plate
Beatty Mch. & Mfg. Co., 936—15th St., Hammond, Ind.
Buffalo (N. Y.) Forge Co., 492 Broadway.
Cincinnati (Ohio) Shaper Co.
Dreis & Krump Mfg. Co., Chicago.
Quickwork Co., The, St. Marys, Ohio.

SHEARING MACHINES—Squaring
Cincinnati (Ohio) Shaper Co.
Dreis & Krump Co., Chicago.
Niagara Mach. & Tool Wks., Buffalo, N.Y.

SHEET BARS
Andrews Steel Co., The, Newport, Ky.
Jones & Laughlin Steel Corp., Pittsburgh.

SHEET METAL MACHINERY
Cincinnati (Ohio) Shaper Co.
Dreis & Krump Mfg. Co., Chicago.
New Albany (Ind.) Mch. Mfg. Co.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Quickwork Co., The, St. Marys, Ohio.
V & O Press Co., Hudson, N. Y.

SHEETS—Aluminum
Aluminum Co. of America, Pittsburgh.

SHEETS—Auto Body
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pgh.
Inland Steel Co., Chicago.
Republic Steel Corp., Youngstown, Ohio.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

SHEETS—Black
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pgh.
Continental Steel Corp., Kokomo, Ind.
Granite City (Ill.) Steel Co.
Ingersoll Steel & Disc Co., Chicago.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Superior Sheet Steel Co., Canton, Ohio.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Weirton (W. Va.) Steel Co.
Worth Steel Co., Claymont, Del.

SHEETS—Blue Annealed
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pgh.
Central Iron & Steel Co., Harrisburg, Pa.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Lukens Steel Co., Coatesville, Pa.
Newport (Ky.) Rolling Mill Co., The.
Ryerson, Jos. T., & Son, Inc., Chicago.
Superior Sheet Steel Co., Canton, Ohio.
Weirton (W. Va.) Steel Co.
Worth Steel Co., Claymont, Del.

SHEETS—Brass, Bronze, Copper, Nickel, Silver or Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Phosphor Bronze Smelting Co., Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

SHEETS—Chrome
American Sheet & Tin Plate Co., Pgh.

SHEETS—Chrome Nickel
American Sheet & Tin Plate Co., Pgh.

SHEETS—Cold Rolled
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburgh.
Continental Steel Corp., Kokomo, Ind.
Inland Steel Co., Chicago.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., Chicago.

SHEETS—Copper Steel
American Sheet & Tin Plate Co., Pgh.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The.
Superior Sheet Steel Co., Canton, Ohio.

SHEETS—Electrical
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pgh.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The.
Republic Steel Corp., Youngstown, Ohio.

SHEETS — Enameling
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pgh.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The.
Superior Sheet Steel Co., Canton, Ohio.

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Ryerson, Jos. T., & Son, Inc., Chicago.
Superior Sheet Steel Co., Canton, Ohio.
Weirton (W. Va.) Steel Co.
Worth Steel Co., Claymont, Del.

SHEETS—Full Finished
American Sheet & Tin Plate Co., Pitgh.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

SHEETS—Galvanized, Flat and Corrugated
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pitgh.
Bethlehem (Pa.) Steel Company.
Continental Steel Corp., Kokomo, Ind.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The.
Pacific Coast Steel Corp., San Francisco, Calif.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos., T., & Son, Inc., Chicago.
Superior Sheet Steel Co., Canton, Ohio.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Weirton (W. Va.) Steel Co.
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American Sheet & Tin Plate Co., Pitgh.
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Superior Sheet Steel Co., Canton, Ohio.
Weirton (W. Va.) Steel Co.

SHEETS—Magnesium Alloys
Dow Chemical Co., 921 Jefferson Ave., Midland, Mich.

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American Sheet & Tin Plate Co., Pitgh.
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Newport (Ky.) Rolling Mill Co., The.
Republic Steel Corp., Youngstown, Ohio.

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Eastern Tool & Mfg. Co., Bloomfield, N. J.
Morgan Engineering Co., The, Alliance, Ohio.
Quickwork Co., The, St. Marys, Ohio.
Wood, R. D., & Co., Philadelphia.

SPECIALTIES—Rubber Covered & Lined
American Hard Rubber Co., 11 Mercer St., N. Y. C.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

SPEED REDUCERS
Boston Gear Wks., Inc., North Quincy, Mass.
Link-Belt Co., Chicago.
Michigan Tool Co., Detroit.
Philadelphia (Pa.) Gear Works.

SPIKES—Track
Ames, W., & Co., Jersey City, N. J.
Illinois Steel Co., Chicago.
Inland Steel Co., Chicago.

SPLICE BARS
Illinois Steel Co., Chicago.
Inland Steel Co., Chicago.

SPONGE IRON
Ekstrand & Tholand, Inc., 441 Lexington Ave., N. Y. C.

SPRAYERS—Metal
Metallizing Co. of America, Inc., Los Angeles, Calif.

SPRING MAKING MACHINERY
Baird Mch. Co., The, Bridgeport, Conn.
Bleemer & Hartley, Inc., Worcester, Mass.

SPRINGS—Car
American Steel & Wire Co., Chicago.
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.

SPRINGS—Extension, Compression, Torsion or Flat
Amer. Spring & Mfg. Corp., Holly, Mich.
American Steel & Wire Co., Chicago.
Barnes-Gibson-Raymond, Inc., Detroit.
Barnes, Wallace, Co., The, Bristol, Conn.
Cook Spring Co., Div. of Barnes-Gibson-Raymond, Inc., Ann Arbor, Mich.
Cuyahoga Spring Co., The, Cleveland.
Dunbar Bros. Co., Bristol, Conn.
Gibson, Wm. D., Co., Chicago.
Hubbard, M. D., Spring Co., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.
Raymond Mfg. Co., Corry, Pa.
U. S. Steel Wire Spring Co., Cleveland, O.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

SPROCKETS
Baldwin-Duckworth Chain Corp., Springfield, Mass.
Boston Gear Wks., Inc., North Quincy, Mass.
Whitney Mfg. Co., Hartford, Conn.

STAMPINGS OR DRAWINGS—Metal
Barnes-Gibson-Raymond, Inc., Detroit.
Barnes, Wallace, Co., The, Bristol, Conn.
Champion Sheet Metal Co., Inc., cor. Squires & Duane Sts., Cortland, N. Y.
Coatesville Plate Washer Co., Philadelphia.
Cook Spring Co, Div. of Barnes-Gibson-Raymond, Inc., Ann Arbor, Mich.
Crosby Co., The, Buffalo, N. Y.
Dunbar Bros., Co., Bristol, Conn.
Eastern Tool & Stpg. Co., Inc., Saugus, Mass
Geuder, Paeschke & Frey Co., Milwaukee.
Gibson, Wm. D., Co., Chicago.
H. & P. Mfg. Co., The, Cleveland.
Hubbard, M. D., Spring Co., Pontiac, Mich.
Lansing (Mich.) Stamping So., So. Penn. Ave.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.
Parish Pressed Steel Co., Reading, Pa.
Raymond Mfg. Co., Corry, Pa.
Sheet Metal Specialty Co., Pittsburgh, Pa.
Torrington (Ct.) Co.
Truscon Steel Co., Pressed Steel Div., Cleveland.
Veeder-Root, Inc., Hartford, Ct.
Worcester (Mass.) Stamped Metal Co.

STAMPS—Steel Alphabets and Figures
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

STAPLES—Wire
Continental Steel Corp., Kokomo, Ind.
Wickwire Brothers, Cortland, N. Y.

STEEL—Acid Resisting
Durion Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

STEEL—Alloy
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Chicago.
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Bissett Steel Co., The, Cleveland.
Carnegie Steel Co., Pittsburgh.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Harrisburg (Pa.) Steel Corp.
Illinois Steel Co., Chicago.
Ingersoll Steel & Disc Co., Chicago.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Pacific Coast Steel Corp., San Francisco, Calif.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Co., The, Canton, Ohio.
Universal Steel Co., Bridgeville, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Alloy, Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.
Moltrup Steel Prods. Co., Beaver Falls, Pa.
Union Drawn Steel Co., Massillon, Ohio.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL—Bright Finished
Union Drawn Steel Co., Massillon, Ohio.

STEEL—Carbon
Andrews Steel Co., The, Newport, Ky.
Carnegie Steel Co., Pittsburgh.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Harrisburg (Pa.) Steel Corp.
Ingersoll Steel & Disc Co., Chicago.
Latrobe (Pa.) Electric Steel Co.

STEEL—Carbon Vanadium
Andrews Steel Co., The, Newport, Ky.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome
American Steel & Wire Co., Chicago.
Andrews Steel Co., The, Newport, Ky.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Manganese
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Nickel
American Steel & Wire Co., Chicago.
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Steel Corp.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Nickel Silver
Ingersoll Steel & Disc Co., Chicago.

STEEL—Chrome Vanadium
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Universal Steel Co., Bridgeville, Pa.

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Rathbone, A. B. & J., Palmer, Mass.
Ryerson, Joseph T., & Son, Inc., Chicago.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL—Cold Rolled Strips
Acme Steel Co., Chicago.
American Steel & Wire Co., Chicago.
Athenia Steel Co., 135 William St., N. Y.
Cold Metal Process Co., The, Youngstown, Ohio.
Griffin Mfg. Co., Erie, Pa.
Inland Steel Co., Chicago.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Stanley Works, The, New Britain, Conn.; Bridgeport, Conn.
Steel & Tubes, Inc., Cleveland.
Superior Steel Corp., Grant Bldg., Ptgh.
Thomas Steel Co., Warren, Ohio.
Weirton (W. Va.) Steel Co.
West Leechburg Steel Co., Pittsburgh.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Cold Rolled Strips, Electric Copper Coated
Thomas Steel Co., Warren, Ohio.

STEEL—Cold Rolled Strips, Electro-Galvanized
Thomas Steel Co., Warren, Ohio.

STEEL—Cold Rolled Strips, Electro Tin Coated
Thomas Steel Co., Warren, Ohio.

STEEL—Cold Rolled Strips, Stainless
Acme Steel Co., Chicago.
Griffin Mfg. Co., Erie, Pa.

STEEL—Corrosion Resisting
American Steel & Wire Co., Chicago.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Midvale Co., The, Nicetown, Phila., Pa.

STEEL—Crucible
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Cutlery
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Universal Steel Co., Bridgeville, Pa.

STEEL—Die
Andrews Steel Co., The, Newport, Ky.
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Universal Steel Co., Bridgeville, Pa.

STEEL—Drill
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Milne, A., & Co., 745 Washington St., N. Y. C.
Pacific Coast Steel Corp., San Francisco, Calif.
Universal Steel Co., Bridgeville, Pa.

STEEL—Electric
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Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Co., The, Canton, O.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—High Speed
Bethlehem (Pa.) Steel Company.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Ingersoll Steel & Disc Co., Chicago.
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Vanadium-Alloys Steel Co., Latrobe, Pa.

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Inland Steel Co., Chicago.
Laclede Steel Co., St. Louis, Mo.
Latrobe (Pa.) Electric Steel Co.
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Superior Steel Corp., Grant Bldg., Ptgh.
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West Leechburg Steel Co., Pittsburgh.

STEEL—Hot Rolled Strips, Electro Zinc Coated
Thomas Steel Co., Warren, O.

STEEL—Hot Rolled Strips, Galvanized
Acme Steel Co., Chicago.

STEEL—Magnet
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Latrobe (Pa.) Electric Steel Co.

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STEEL—Open Hearth
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Pittsburgh (Pa.) Steel Co.
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Timken Steel & Tube Co., The, Canton, O.

STEEL—Rustless
Acme Steel Co., Chicago.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Griffin Mfg. Co., Erie, Pa.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.

STEEL—Screw
Bliss & Laughlin, Inc., Harvey, Ill.
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Carnegie Steel Co., Pittsburgh.
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Wetherell Bros. Co., Cambridge, 39, Mass.

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Forging & Casting Corp., The, Ferndale, Mich.
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STEEL—Vanadium
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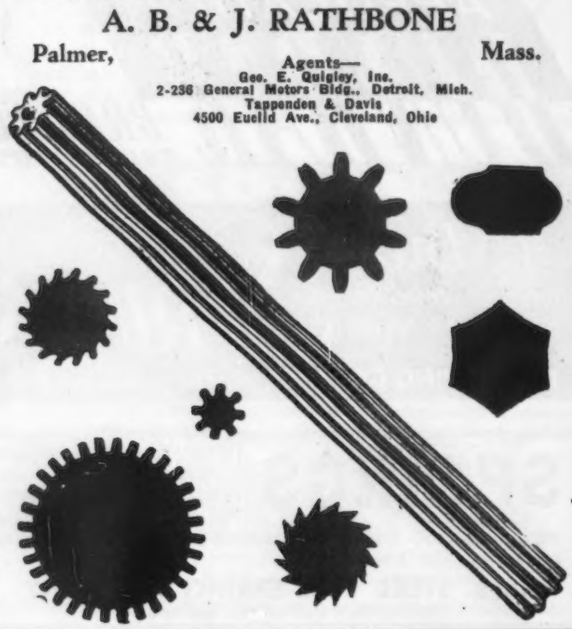

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Murdock Mfg. & Supply Co., The, Cincinnati.

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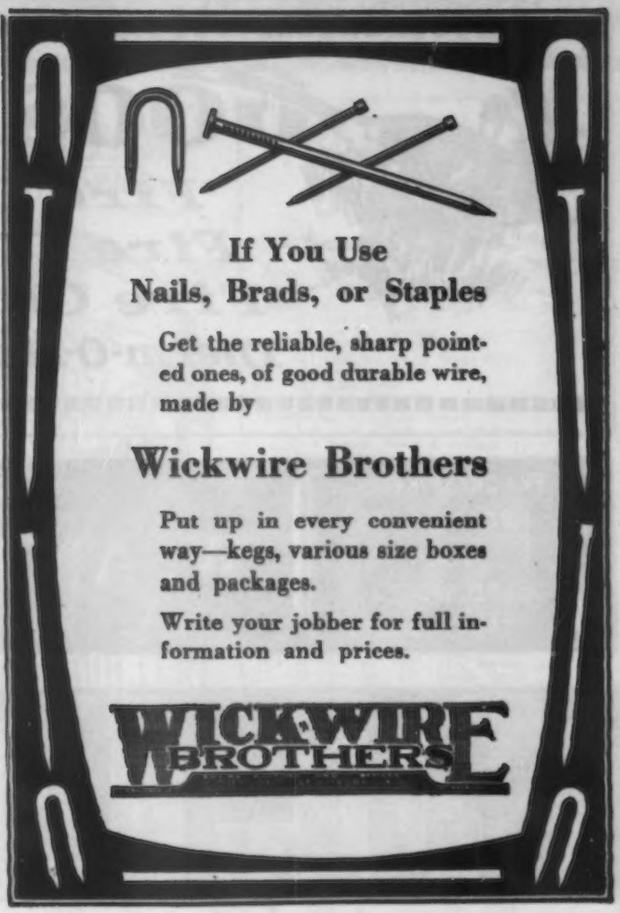
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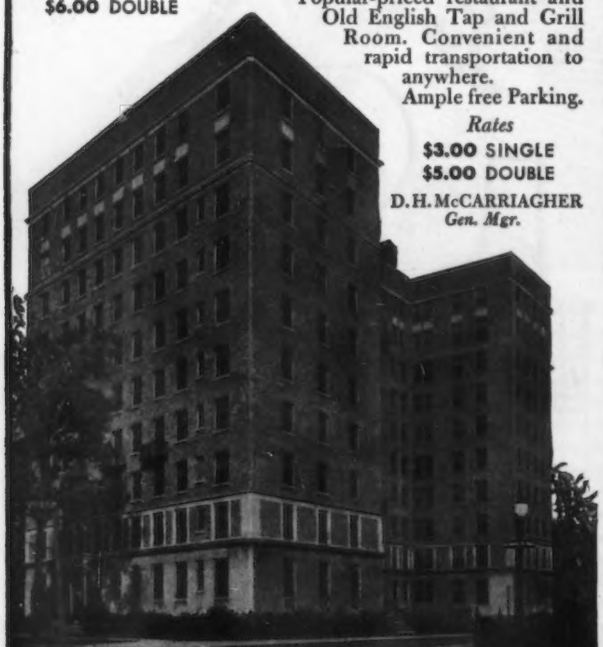

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No. 2 Cincinnati Vertical Miller, high power type
18" Cincinnati Duplex Milling Machine
20"x10' American Geared Head Engine Lathe
48"x48"x26' Cincinnati Planer, 4-heads
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16"x72" Landis Crank Shaft Grinder

"All these machines motor drive, with motors"

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Newton 84" Rotary Milling Machines, two heads, one roughing and one finishing, direct motor driven by 3 P 60C 220V motors, with automatic compensators, excellent condition.

300 other high grade metal and woodworking machines.

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A standard 48" machine, except a shorter table to give 36" travel.

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16"x6' Monarch geared head, motor in base
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Also 1000-1500-2000-2500-lb. Chambersburg Steam Drop Hammers
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ARC WELDERS—(2)-200 Ampere 60-20 volt General Electric, driven by 7½ H.P. 440 volt 3 phase 60 cycle G.E. Motors Type KT 1750 RPM. Variable Voltage Control.
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Boring Mill, 24" BULLARD, Prod. Type
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1—27½	450/1350	El. Dyn.	158
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Span 22', Motors 3 Phase,
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They are capable executives with fine engineering training. They believe that they can acquire a suitable plant without cash outlay. Payments to be made from operations.

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TREASURY DEPARTMENT, Procurement Division, Public Works Branch, Washington, D. C., June 22 1935.—Sealed proposals in duplicate will be publicly opened in this office at 1 p.m., July 30, 1935, for furnishing all labor and materials and performing all work for the construction of the U.S.P.O. at Tracy, Calif. Attention is directed to the special conditions of bidding set forth in the specifications. Upon application, one set (1) of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the government, will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Assistant Director of Procurement, Public Works Branch.

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U. S. Patent Rights Available

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TREASURY DEPARTMENT, Procurement Division, Public Works Branch, Washington, D. C., June 19, 1935.—Sealed proposals in duplicate will be publicly opened in this office at 1 p. m., July 24, 1935, for furnishing all labor and materials and performing all work for the construction of U.S.P.O., etc., at Wallace, Ida. Attention is directed to the special conditions of bidding set forth in the specification. Upon application, one set (1) of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U.S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Assistant Director of Procurement, Public Works Branch.

TREASURY DEPARTMENT, Procurement Division, Public Works Branch, Washington, D. C., June 21, 1935.—Sealed proposals in duplicate will be publicly opened in this office at 1 p.m., July 19, 1935, for furnishing all labor and materials and performing all work for the construction of the U.S.P.O. at Cliffside Park, New Jersey. Attention is directed to the special conditions of bidding set forth in the specification. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Assistant Director of Procurement, Public Works Branch.

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Care *The Iron Age*, 239 W. 39th St., New York

Business Opportunities

TREASURY DEPARTMENT, Procurement Division, Public Works Branch, Washington, D. C., June 19, 1935.—Sealed proposals in duplicate will be publicly opened in this office at 1 p. m., July 17, 1935, for furnishing all labor and materials and performing all work for the construction of the U.S.P.O. at Ilion, N. Y. Attention is directed to the special conditions of bidding set forth in the Specifications, and bulletin no. 51 of the Federal Emergency Administration of Public Works. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U.S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Assistant Director of Procurement, Public Works Branch.

TREASURY DEPARTMENT, Procurement Division, Public Works Branch, Washington, D. C., June 24, 1935.—Sealed proposals in duplicate will be publicly opened in this office at 1 p. m., July 24, 1935, for furnishing all labor and materials and performing all work for construction of "B" Postal Sta., U.S.P.O. (except elevator), New York, N. Y. Attention is directed to the special conditions of bidding set forth in the specifications, and bulletin no. 51 of the Federal Emergency Administration of Public Works. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $10 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Assistant Director of Procurement, Public Works Branch.

TREASURY DEPARTMENT, Procurement Division, Public Works Branch, Washington, D. C., June 24, 1935.—Sealed bids in duplicate will be publicly opened in this office at 1 p. m., July 22, 1935, for furnishing all labor and materials and performing all work for Construction complete of the U.S.P.O. at Upper Sandusky, O. Attention is directed to the special conditions of bidding set forth in the specifications, and bulletin no. 51 of the Federal Emergency Administration of Public Works. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $10 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Assistant Director of Procurement, Public Works Branch.

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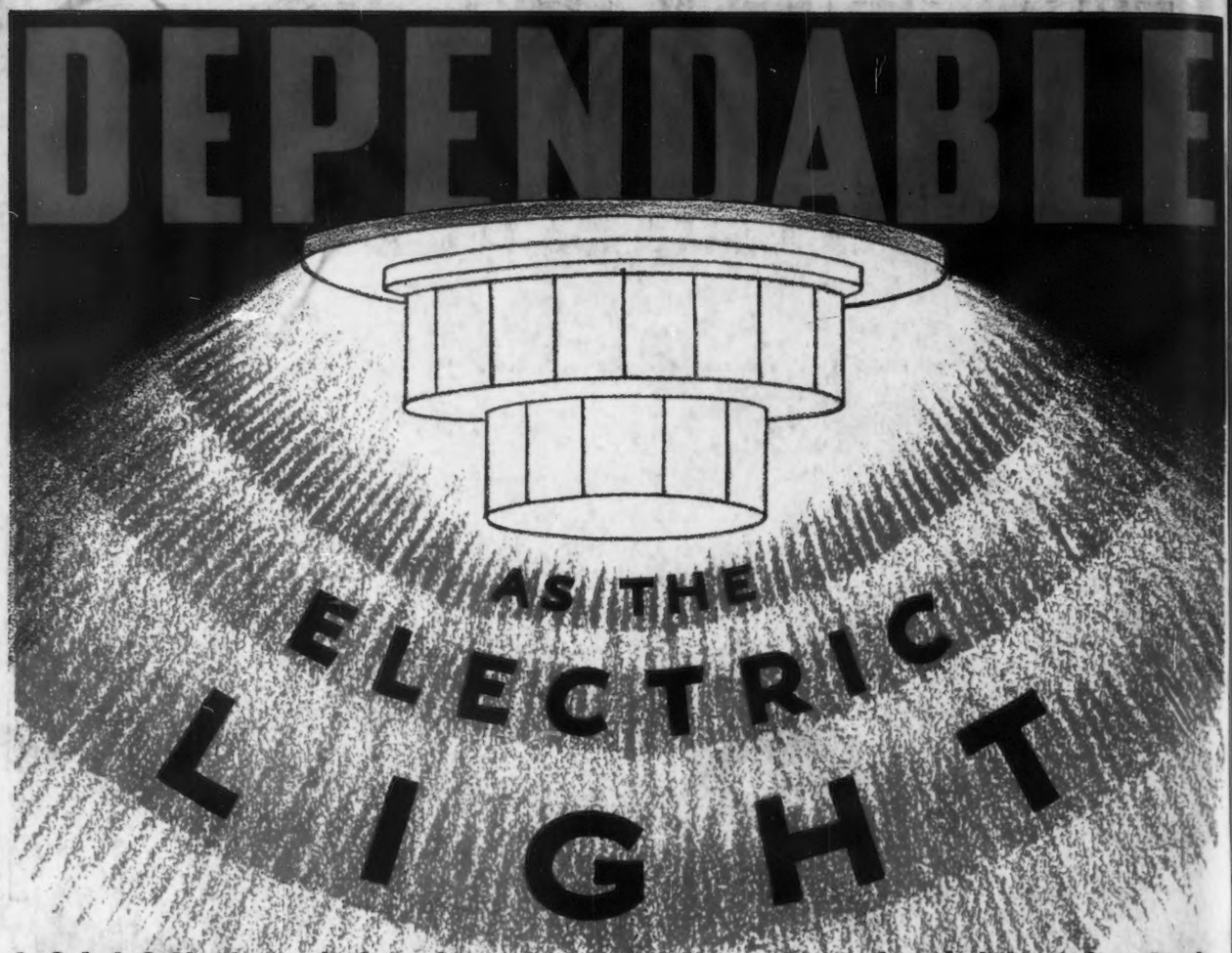

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